



# Value Relevance of Environmental Sustainability Information Disclosure

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## **Author's contribution**

The sole author designed, analysed, interpreted and prepared the manuscript.

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## **ABSTRACT**

To empirically investigate the value relevance of environmental sustainability information disclosure of listed oil and gas firms in Nigeria, this study made use of Ohlson 1995 Valuation Model and a fifteen (15) year time period beginning from year 2006 to year 2020. Further, the study applied carbon emission information disclosure data as the non-financial information and hypothesized that carbon emission information disclosure is value irrelevant in Nigeria. In this study, ex-post facto and descriptive research design based on a panel data set secondarily sourced from annual financial reports of eight (8) listed oil and gas firms in Nigeria was employed. Robust least square regression analysis technique was employed to test the formulated hypotheses. Results obtained from the descriptive statistics reflects a poor carbon emission reporting situation in Nigeria. The result reveals that on average about 2% of the sampled firms disclosed information relating to carbon emission during the period under study. Specifically, the notion that investors perceive the control of carbon emission as severe cost rather than profit was established. This is due to the outcome from the regression result which suggest that stock market investors reactions towards carbon emission disclosure of oil and gas firms in Nigeria is negative. However, this study recommends that to relieve such negative consequences in the capital market, managers of oil and gas firms in Nigeria must take appropriate action to communicate their commitments and efforts genuinely and adequately around carbon reduction to investors. This study contributes to the growing field of environmental sustainability accounting, particularly from a market that is underdeveloped like Nigeria, by offering empirical evidence relating to the relevant value of carbon emission reporting with practical financial implications that will be most helpful to investors.

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## 1. INTRODUCTION

As a result of climate change, many researchers are now interested in the voluntary carbon disclosure information provided by businesses [1]. Managers are also accountable for the well-being of society and the natural world [2]. Environmental performance is defined by market participants as a company's disclosure of its environmental responsibilities, as stated by Cormier et al. [3]. Reporting on an organization's environmental consequences, success in managing those impacts, and contribution to ecological and sustainable development is what environmental accounting is all about, according to Onyebuanyi [4]. It processes both monetary and non-monetary data pertaining to environmental and biological impacts in order to determine and explain the actual environmental costs, such as responsibility fees or waste disposal fees [5].

Managers try to bridge the knowledge gap between themselves and their investors by making information publicly available through voluntary disclosure (a practice recognized by IFRS) [6]. The term "information asymmetry" is used to describe the situation in which management's level of knowledge exceeds that of current or potential investors. By doing so, the adverse selection of low-quality investments and the related moral hazards can be mitigated, and resources can be better allocated (Beaver, 1998). (Kim et al., 2017) In a similar vein, Plumlee et al. [7] argues that openness in the workplace improves trust, credibility, and the bottom line, ultimately leading to greater firm value. In order to improve their environmental performance, businesses must voluntarily disclose their carbon emissions data in accordance with ISO14064-1 [8].

Managers are under pressure to reveal information about their company's carbon emissions so that they can better investigate the elements that lead to firm value [9]. Carbon emission reporting is of interest to corporate management, customers, investors, regulators, standard setters, NGOs, academics, and researchers. Comprehensive carbon reporting is advocated by the UN Framework Convention on Climate Change and the Carbon Disclosure Project in order to track, reward, and mitigate climate change while also enhancing business performance (CDP). Currently, investors

consider a firm's pollution prevention efforts and the likelihood of environmental law infractions [10].

Investors, according to Freedman and Jaggi [11], do care about pollution data (Carbon Emission). The impact of disclosing environmental information on a company's worth is a topic of debate among academics. Environmental performance has a negative impact on corporate market value, according to Hassel et al. (2005), and environmental investments have a negative impact on returns and market values. Certain academics have concluded that caring for the environment improves both profitability and competitiveness. According to research by Matsumura et al. [12], companies can increase their median market value by \$2.3 billion by voluntary disclosure of carbon emissions. Plumlee et al. [7] found that a company's valuation changed depending on the extent to which its voluntarily disclosed environmental information was accurate. According to the existing literature, environmental disclosure would increase firm value under the value-added asset theory but decrease under the altruistic liability hypothesis.

80 percent of Nigeria's GDP and its foreign currency earnings come from the oil and gas industries [13]. Most Nigerian crude oil comes from a large number of small producing fields in the swamps of the Niger Delta; however, multinational corporations have acted in a careless manner, encouraging environmental degradation, lacking transparency, and being insensitive to stakeholder concerns. This has led to persistent community unrest and public criticism [14].

Higher carbon emissions are associated with lower company value, according to the vast majority of studies on the value significance of carbon emissions data [15,16,12,17-22]. Empirical evidence on the value relevance of carbon risk and opportunity information is skewed toward industrialized nations, and only a few have been conducted in less developed countries [23,24,25]. Nigeria, like many other developing countries, is contributing more to the rapid increase in emissions than it otherwise would be because of economies of scale and rapid economic expansion [23]. Although some oil and gas enterprises in Nigeria report their carbon emission data voluntarily, the question

remains whether doing so adds value for investors. It is feasible for businesses to disregard the significance of objectivity and the quality of environmental accounting information disclosure because the provision to disclose environmental sustainability information is not mandatory. In light of this, the purpose of this research was to try to answer the question by examining the value relevance of environmental sustainability information disclosure of listed oil and gas firms in Nigeria, with a focus on carbon emission disclosure, which has received comparatively little attention thus far.

The paper presents two competing hypotheses, the Signaling theory and the Altruistic responsibility theory, to forecast the usefulness of environmental sustainability information disclosure. Management can give stakeholders, including shareholders, reliable data on the company's carbon performance through voluntary carbon disclosure. Information asymmetry can be mitigated with value-relevant carbon data. Signaling theory suggest that firm managers should provide information on their carbon performance, [26,27,15]. However, voluntary carbon disclosure undertaken in low-standard countries to reach improved environmental norms is not benefiting their shareholders. Such actions are detrimental to market value and may be indicative of managerial eccentricities [9].

The rest of the paper is structured as follows. Section 2 introduces literature review and hypothesis testing while section 3 describes the research design. Section 4 presents and discusses the empirical results while section 5 concludes the paper.

## **2. LITERATURE REVIEW**

### **2.1 Conceptual Literature**

#### **2.1.1 Environmental Sustainability Information Disclosure**

Herbert et al. [28] describes the global best practice for sustainability reporting as disclosing the firm's environmental, economic, and social performance. A company's environmental report discloses its manufacturing's environmental impact. The economic report also discloses the firm's sustainable activities' economic impact, while the social report covers the year's social responsibility actions [28]. Global sustainability reporting standards begin with GRI standards.

Global EES reporting standards are modular and interrelated [29]. Sustainability reporting is essential to profit maximization plans and global assessments of companies' financial performance and impact on the economy and environment [30]. Strategic sustainability reporting emphasizes incorporating social and environmental factors into business decisions [31]. This helps firms integrate their environment, stakeholders, and communities. Due to their potential dangers to the host community and their role in economic development, Nigeria's oil and gas sector should establish sustainability reporting in the corporate community [14].

#### **2.1.2 Environmental sustainability information disclosure and firm value**

Improved transparency allows for monitoring of the reporting firm's activity and reflects back to the real activities of the firm, which is why theoretical research implies that required reporting stimulates changes in firm behavior [32]. As contracting stakeholders of the firm (e.g., investors, government agencies, NGOs, customers, employees, etc.) gain access to improved information, this enhances their ability to exert pressure on the disclosing firm to change its behavior. Firms in turn face increased accountability over the mandated information, as stakeholders exerting pressure expect to see performance improvements over time [33]. Asymmetric information theory states that voluntary carbon information sharing minimizes information asymmetry to capital market outsiders, including investors [6].

The cost-concerned school claims that environmental investments and excessive carbon emissions raised expenses, lowering earnings and market values [2]. Environmental performance decreases company market value [15] (Freedman and Jaggi, 1982). First, carbon emissions are externalities, and how corporations internalize them is uncertain. However, the market may reflect such uncertainty, including future carbon emissions obligations. Second, capital markets may ignore VCDI if it is unreliable [34]. If voluntary carbon information disclosure is insufficient, market players will pay more, which corporations will pass on (Johnston, 2005). Non-disclosure sends a negative signal [35] and lowers business value.

Modern literature has extensively studied environmental sustainability information

disclosure and company value. The link may be positive, neutral, or negative [36] and divided into three groups: (a) studies that find a positive relationship, suggesting that environmental sustainability improves firms' value, (b) studies that find a negative relationship, adopting the idea that a firm must use its resources only to maximize profits or else it will have negative results [37], and (c) [38,39]. Therefore, drawing upon the revelations from prior related studies, this study hypothesize that carbon emission information disclosure has no significant relevant value among listed oil and gas companies in Nigeria and formulate the hypothesis thus:

***Ho: Carbon emission disclosure has no significant relevant value among listed oil and gas firms in Nigeria***

## **2.2 Theoretical Framework**

### **2.2.1 Signaling theory**

In line with the signaling theory, carbon performance information should be made available by firm managers [16]. Investors can see how a company handles carbon risks and capitalizes on carbon possibilities through voluntary disclosure. Without disclosing their carbon emissions, businesses are subject to greater carbon risk and regulatory expenses. Voluntary carbon disclosure is a method by which businesses can notify interested parties, such as shareholders, about their strategy for dealing with carbon emissions [20,21,22]. By alerting stakeholders, carbon disclosure lowers knowledge asymmetry and capital costs [40,7,41]. The outcome in the study of Schiemann and Sakhel [25] reveal a gap in information concerning the physical risks associated with climate change while Bui et al. (2020), document that carbon disclosure reduces equity capital costs.

### **2.2.2 Altruistic liability theory**

The altruistic liability idea requires polluting corporations to clean up their pollution, which will increase their costs. This view considers environmental improvements a cost. Disclosure of carbon information raises the firm's risk and lowers its value if and only if it is a risk factor [42]. As green activities become public, the company's value will plummet. According to traditional economics, it is cheaper to do business in countries with little or no

environmental control than in countries with rigorous regulations that penalize polluters with fines, responsibilities, and administrative or legal action (Stewart, 1993). Adhering to local norms may save firms money in nations with lenient or poorly executed environmental laws, as most developing countries spend less than 1% of their GDP on environmental protection. Local standards may allow companies to re-capitalize old machinery in countries with little oversight or enforcement. In general, adhering to tougher environmental standards when not required is inefficient. Thus, companies who invest in developing nations to improve global environmental conditions lose money. The acts may indicate managerial quirks and lower market value.

## **2.3 Empirical Review**

Emeka-Nwokeji and Osisioma [43] determined how environmental, social, and governance disclosures affect firm value of non-financial firms in a developing country of Nigerian. Regression analysis was employed to analyse the data which were collected from related annual financial report of non-financial listed firms in Nigeria. the outcome of the analysis showed that environmental and governance disclosures explained firm value variation, but social sustainability disclosure did not.

Okpala and Iredele [44] examine how corporate social and environmental disclosure affects the market value of eighty-four listed non-finance companies in Nigeria. information on social and environmental disclosures were extracted annual financial reports of the listed firms. The outcome suggest that corporate social and environmental disclosures diminish company market value. This conclusion is unusual for Nigeria due to the small number of ethical investors that value environmental and social issues.

In their study of value relevance of sustainability reporting's in Iraq's tourist sector, Khaghaany, Kbelah, and Almagtome [36] used share price and traded shares to indicate company value. The independent variables include economic, environmental, and social sustainability disclosure information based on a Global Reporting Index GRI score used to classify them. Sustainability reporting accounted for 54% of share price fluctuations but show no significant impact on share price of Iraqi tourism enterprises during the study period.

Echobu, Ekundayo, and Abu [45] investigated whether reporting a corporation's social and environmental impact helps people make decisions. The study employed modified Ohlson (1995) model to assess oil and gas corporations based on share price as the dependent variable and social and environmental disclosures as explanatory variables. Content analysis based on GRI indicators was used collate the data which were employed for data analysis. The study find that social information disclosure is relevant for making decisions that can positively and significantly influence share price while environmental sustainability disclosures was insignificant.

Herbert, Nwaorgu, Onyilo, and Iorombagah [28] used content analysis to assess Nigerian upstream petroleum businesses' sustainability reporting and performance. The article objectively assessed the sustainability reports of major oil and gas businesses using GRI standards and found unsatisfactory reporting of sustainable economic performance. Due to inadequate environmental legislation enforcement, oil and gas corporations are less affected by environmental conservatism.

### 3. METHODOLOGY

The purpose of this research was to apply the Ohlson 1995 valuation model to find out if publicly traded oil and gas companies in Nigeria use sustainability reporting as a means of gauging their own worth. The market value of a publicly traded company depends on its past performance, current prospects, and other factors [45]. The Ohlson model is extended to include environmental components of sustainability reports, which can potentially increase value. Carbon emission, which is non-financial information to be examined, is taken into account, while asset growth serves as a control variable. The non-financial information of the firms was collated from the sampled firms' annual reports using content analysis technique and guided by the GRI (G4) standard guidelines which have been widely employed in environmental sustainability studies. The GRI (G4) standard guidelines have been considered to enhance the reliability of narrative reporting including environmental

sustainability information disclosures. For the purpose of data collation, this study employs purposive sampling technique which require certain criteria to be met by the sampled companies. The key criteria are accessibility of annual financial reports that reveals all relevant information needed for the analyses over the entire selected period of study. Further, selected firms must have joined the Nigerian Exchange Group before year 2011 hence, a balanced panel data structure suitable for data analysis is readily achieved. Therefore, for the purpose of analysis only eight (8) oil and gas firms that have all relevant information made the final sample size. The study's focus period (2006-2020) spans the years during which IFRS was implemented in Nigeria. This investigation used a descriptive research strategy based on a panel of past data to draw conclusions. The developed hypotheses were put to the test using a robust least squares regression analysis.

#### 3.1 Model Specification

Ohlson (1995) Valuation Model

Drawing from the Ohlson (1995) valuation model, the model in this study begins by explaining price  $P_{it}$  of stock  $i$  at time  $t$  as a function of book value per share  $BVPS_{it}$ , abnormal earnings per share  $AEPS_{it}$  and other relevant non-financial information  $v_{it}$ : where earnings per share ( $EPS_{it}$ ) is a proxy for  $AEPS_{it}$  (Goncharov et al., 2006; Gu, 2007).

$$P_{it} = BVPS_{it} + \alpha_1 AEPS_{it} + \alpha_2 v_{it} \quad (1)$$

Therefore, introducing the non-financial information (Carbon Emission) enable us to re-write the model as:

$$SP_{it} = \alpha_1 BVPS_{it} + \alpha_2 EPS_{it} + \alpha_3 CAREM_{it} + \alpha_4 ASSGRT_{it} + \mu_{it} \dots \dots \dots (2)$$

Where:

- SP = Stock Price
- BVPS = Book Value per share
- EPS = Earnings Per Share
- CAREM = Carbon Emission
- ASSGRT = Asset Growth

**Table 1. Operationalization of variables**

Variable	Measurement	Source
<b>Share Price</b>	December closing share price	Kocamis & Gungor (2014).
<b>Earnings per Share</b>	Earnings Per Share in per share basis is computed as net profit after tax divided by outstanding shares.	Umoren, Akpan & Okafor [14]
<b>Book Value per Share</b>	Book to Market value in numbers is computed as total equity divided by market capitalization.	Mahmes (2016)
<b>Carbon Emission</b>	Content Analysis based on Global Reporting Initiative (GRI) Checklist	Baldarelli, Baldo, & Neshava-Kioseva (2017)
<b>Asset Growth</b>	Total asset growth in percentage is computed as current year total asset minus previous year total asset divided by previous total asset	Eljayash, Kavanagh & Kong (2013)

*Author's Compilation, 2023*

#### 4. RESULTS AND DISCUSSION

To examine the value relevance of environmental sustainability information disclosure of listed oil and gas firms in Nigeria for the period between 2006 and 2020, first descriptive statistics was used to evaluate the characteristics of the data in terms of its mean, minimum, maximum and standard deviation. Further, to test for normality of data, Shapiro Wiki procedure was employed before the regression analysis was conducted. Next, Spearman Rank Correlation analysis technique was employed to check for possible undesirable correlation among the variables of interest. In checking for consistency and efficiency of the estimates, post-regression analysis test to include test for multicollinearity and the test for heteroscedasticity was carried out. Breusch-Pagan test for heteroscedasticity reveals the presence of heteroscedasticity in the estimated model hence the researcher proceeded to employ the Robust Standard Least Square Regression Analysis technique which was relied upon for hypothesis testing.

Table 2 describes the data in terms of its mean, standard deviation, minimum and maximum statistics. It is observed that between 2006 and 2020 in terms of firm value as measured by stock price, the maximum value (1,301.01), earning per

share (143.96) and book value per share (1,090.92) for the sampled oil and gas firms in Nigeria. Their minimum values are (-88.6), (-52.98) and (-5.67) respectively for the same period under consideration. Also, the descriptive statistics result reveals a wide disparity in the mean of stock price, earning per share and book value per share as reflected in their corresponding standard deviation. Further, the data for environmental (carbon emission) disclosures shows a mean value of 0.194175 suggesting that only about 2% of the sampled firms provided information on carbon emission in their annual reports following the GRI (G4) guidelines during the period under review. This implies that oil and gas firms in Nigeria barely report the impacts of their activities on the environment.

From Table 3, it is observed that the dependent variables of stock price (Prob > z = 0.00000), earnings per share (Prob > z = 0.00000), and book value per share (Prob > z = 0.00000) are not normally distributed since the probability of their z-statistics is statistically significant at 1% significant level. The same can be said for the independent variables of the study as well as the control variable. This interpretation is justified following the study of Bera and Jarque (1982).

**Table 2. Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
SP	98	23.11316	159.2194	-88.6	1301.03
EPS	110	6.015909	21.99839	-52.98	143.96
BVPS	110	52.41973	144.444	-5.67	1090.92
CAREM	103	.0194175	.1386618	0	1
ASSGRT	97	20.7168	57.39923	-100	330.25

*SOURCE: Author's Computation 2022*

**Table 3. Shapiro-Wilk W test for normal data**

Variable	Obs	W	V	z	Prob>z
SP	98	0.42309	46.836	8.524	0.00000
EPS	110	0.44303	49.806	8.715	0.00000
BVPS	110	0.32137	60.686	9.155	0.00000
CAREM	103	0.52032	40.594	8.229	0.00000
ASSGRT	97	0.77886	17.801	6.377	0.00000

SOURCE: Author's Computation (2022)

**Table 4. Spearman rank correlation analysis**

	SP	EPS	BVPS	CAREM	ASSGRT
SP	1.0000				
EPS	0.1780	1.0000			
BVPS	0.0561	0.5582	1.0000		
CAREM	-0.0026	-0.1658	-0.1790	1.0000	
ASSGRT	0.1666	0.2264	-0.0199	0.1158	1.0000

SOURCE: Author's Computation (2022)

**Table 5. Regression analysis**

Variables	Earnings Per Share	Book Value Per Share	Carbon Emission	Asset Growth	Constant
<b>Financial Distress Model</b>					
<b>Coefficient</b>	1.665	-0.258	-72.414	0.247	-10.658
<b>t_ Statistics</b>	(2.63)	(-1.44)	(-2.32)	(2.56)	(-1.64)
<b>Probability_t</b>	{0.010} **	{0.153}	{0.022} **	{0.012} **	{0.105}
<b>No. of Obs.</b>	<b>110</b>				
<b>Prob. F statistics</b>	<b>0.0067</b>				
<b>R<sup>2</sup></b>	<b>0.14</b>				
<b>VIF</b>	<b>&lt; 5</b>				

Source: Authors' Computation (2022)

Table 4 shows both the magnitude and the direction of association between stock price, earning per share, book value per share and environmental disclosures. Specifically, the analysis from the Spearman's rank correlation showed that stock price (-0.0026), earning per share (-0.1658) and book value per share (-0.1790) have negative association with the independent variable. Meanwhile, asset growth (0.1158) is seen to correlate positively with the independent variable. However, it is observed that all the associations are seen to be weak (less than 0.8), hence there is no room to suspect the presence of collinearity.

#### 4.1 Discussion of Regression Result

Table 5 shows regression results. The Fisher statistics and probability value (0.0067) indicate that the model is fit and can be utilized for interpretation and policy recommendations. The model's R<sup>2</sup> is 0.1431, meaning the independent

and control variables explain 14.31% of the dependent variable's variation. Specifically, the researcher provided interpretation for the estimates obtained from the robust standard error analysis. Based on the outcome presented in the table, it is evident that carbon emission is value relevant in Nigeria. Evidently, carbon emission economic magnitude as obtained from the result signifies that one standard deviation change in carbon information reporting by the average company in the sample results in about 72.41% decrease in the share price of the firm. This result supports the idea that large emitters using voluntary carbon disclosure solely to affect stakeholders' perceptions rather than as a credible indication of corporate performance should be easily spotted by the public and media.

The outcome obtained from this study supports those of Choi and Luo, [20-22]; Clarkson et al., [17,18]; and Matsumura et al. [12], which indicates that corporate carbon emissions affect

investor behavior and business value. This conclusion shows that enterprises with higher carbon emissions are generally seen as bad carbon performers and are significant energy users and industrial waste producers which somehow describes the case of the Nigerian oil and gas firms, causing major environmental and community pollution. These corporations are subject to climate policies and regulations, receive a lot of press coverage, and are closely monitored by many stakeholders. According to [46], China's emissions pricing program covers carbon emissions, thus investors should expect a decrease in companies' future cash flows to settle future liabilities related to such emissions. The outcome strongly supports the altruistic responsibility theory, which states that releasing carbon emission information raises the firm's risk and decreases its value if and only if all such information is considered a risk factor [47-50]. The conclusion contradicts Jung et al. [24], who suggest that investors view more carbon emission disclosure as a good sign of firms' management of exposure to future regulatory costs and that significant carbon emitters are anticipated to benefit more from voluntary disclosure [51-54].

## 5. CONCLUSION AND RECOMMENDATION

This study evaluates the value relevance of environmental sustainability information disclosure of oil and gas firms in Nigeria with special reference to carbon emission information disclosure. Whether or not information on carbon emission disclosure is able to tweak decisions that will affect stock prices of oil and gas firms was tested using regression analysis. This study concludes that disclosing environmental sustainability information via carbon emission of oil and gas firms in Nigeria has value which is significantly relevant to corporate investors. Specifically, the study reports that investors in Nigeria show negative concerns to carbon emission information disclosure during the period under review. This finding is consistent with the altruistic liability theory which posit that carbon information disclosure increases the firm's risk and leads to a decline in corporate value if information on carbon emission is regarded as a risk factor. Thus, the firm value will decrease as they disclose their environmental efforts. However, this study suggests that Nigerian oil and gas managers should communicate their carbon reduction targets and efforts to investors to mitigate capital market effects. The credibility

crisis will worsen if the corporation appears to be hiding negative news or acting irresponsibly [55-58].

## 5.1 Future Thrust

This study can be extended in several ways. Further research is needed on the value relevance of the interaction effect of environmental and social performance on the market value of equity and the investigation of such relations in large-, mid- and small-cap listed companies in Nigeria. Understanding how environmental and social norms may differ across industries and how they affect environmental/social performance relations and stock prices would be a valuable area for future research. The results of this study are limited to the data set that was provided by the machame ratios.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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