**IMPACT OF GREENHOUSE GAS CHARACTERISTICS DISCLOSURE ON THE MARKET VALUE OF OIL AND GAS COMPANIES IN NIGERIA (2015-2023)**

***ABSTRACT***

*This study examines the impact of emissions, effluents, and waste management disclosures on the market value of oil and gas firms in Nigeria. Specifically, it aims to evaluate the effects of emissions and effluents disclosure and waste management disclosure on the market capitalisation of these firms. The population of the study is made up of nine (9) five publicly oil and gas companies listed on the Nigerian Exchange Group (NGX) as at December 31, 2023. The purposive sampling technique was used to select five (5) of the companies that provide substantial environmental disclosures in their annual reports. Data, covering the period 2015-2023, were collected from the NGX Fact Book and annual reports of the companies selected. The paper employed descriptive statistics to present data characteristics while correlation analysis explored the relationships between environmental disclosures and market value. To assess how these disclosures predict market value, multivariate regression analysis was conducted. The statistical analysis was performed using Jamovi software (Version 2.3.28). The findings indicate that emissions and effluents disclosure has a negative and statistically insignificant effect on market value while waste management disclosure had a positive and statistically significant effect on market value. The study concludes that emissions and effluent disclosures is insignificant, while waste management disclosures significantly boost market value in Nigerian oil and gas companies. This study contributes to the literature on environmental disclosures in Nigeria's oil and gas sector, and recommends improved transparency in reporting practices to enhance market competitiveness.*

**Key words:** Emissions, Effluents disclosure, Waste management; Market value, Market capitalization

**1. INTRODUCTION**

Environmental Accounting Disclosure (EAD) has gained prominence as global attention shifts towards sustainability. The oil and gas sector faces increasing scrutiny due to its significant environmental impacts, including greenhouse gas emissions, oil spills, and habitat destruction responsible (International Energy Agency, 2021). Governments, investors, and civil society groups are pressuring firms in this sector to adopt transparent environmental reporting practices. For instance, in 2020, 96% of the world’s 250 largest companies reported on sustainability, primarily focusing on environmental impacts such as emissions and resource usage (KPMG, 2022). This highlights the growing expectation for businesses to align their operations with global sustainability goals to manage risks and foster long-term resilience.

The adoption of sustainability reporting, specifically through Environmental, Social, and Governance (ESG) metrics, underscores this shift in corporate priorities. Companies worldwide are expected to detail their environmental performance, covering emissions, waste management, and adherence to environmental regulations (Chopra et al., 2023). In Africa, the oil and gas sector, crucial to the economies of countries like Nigeria, Angola, and Libya, presents severe environmental challenges. These include oil spills, gas flaring, and deforestation, with limited regulatory enforcement exacerbating the situation. Firms in African oil-producing nations lag in adopting robust EAD due to weak regulations and limited stakeholder pressure (Azuazu, et al., 2023). However, the increasing demand for corporate transparency is gradually driving change, with companies recognizing the long-term financial benefits of integrating sustainability into their operations (Arena, Bozzolan & Michelon, 2014).

In Nigeria, the largest oil producer in Africa, the oil and gas sector is central to the country’s economy but also a major contributor to environmental degradation, particularly in the Niger Delta (Akeju & Oguntimein, 2023). Environmental accounting disclosure is gradually gaining traction in Nigeria, with an emphasis on corporate social responsibility (CSR) and sustainability reporting. However, challenges remain, particularly the weak enforcement of environmental laws (Igbekoyi et al., 2022), which limits the effectiveness of disclosures.

Beyond enhancing transparency, EAD has the potential to improve financial performance. Research suggests that companies engaged in environmental reporting may boost their market value by strengthening reputation, operational efficiency, and stakeholder trust (Ahakiri, Imong & Ogar-Abang, 2023). This is particularly relevant in Nigeria, where public trust in the oil and gas sector has been undermined by environmental degradation. Research also indicates that transparent emissions reporting can positively influence a company's market value by reducing information asymmetry and enhancing investor trust (Dharma, Marimutu & Alvia, 2024).

The legitimacy theory posits that aligning corporate activities with societal expectations, including environmental responsibility, can enhance competitive advantage (Mousa & Hassan, 2015). However, the relationship between environmental disclosures and market value is nuanced. Some studies show that while EAD can enhance firm value, the costs of implementing environmental initiatives may outweigh immediate financial benefits (Ayuba & Yunusa, 2023). This underscores the need for further research to clarify how EAD influences the market value of oil and gas firms in Nigeria. In the global oil and gas industry, environmental accounting disclosure (EAD) has evolved into a critical aspect of corporate reporting, reflecting a firm’s commitment to environmental management. With the oil and gas sector responsible for 42% of global CO₂ emissions from fuel combustion (McKinsey & Company, 2020), firms face mounting pressure to disclose their environmental impacts and strategies. Globally, significant progress has been made in countries with stringent environmental regulations. However, the Nigerian context presents challenges, including weak enforcement and limited transparency in environmental reporting by oil and gas firms (Uwaoma & Ordu, 2016).

Despite calls for improved corporate social responsibility (CSR) and EAD practices, the direct impact of these disclosures on firm value remains underexplored in Nigeria. Globally, companies with strong environmental disclosure tend to perform better, with a 67% increase in market capitalization for firms effectively reporting their sustainability efforts (KPMG, 2020). However, such evidence is sparse in Nigeria, where the oil and gas sector contributes significantly to GDP but lacks comprehensive environmental reporting structures (World Bank, 2023). Different studies had examined sustainability reporting and firm value, such as Osayabor and Izedonmi (2023), Emeka-Nwokeji and Osisioma (2019), and Aliyu-Saleh et al. (2022) likewise, different studies also had been conducted on the effect of environmental accounting disclosure on firm value (Gbenga & Josiah, 2020; Olagunju & Ajiboye, 2022; Adegbie et al., 2020; Akeju & Oguntinmein, 2023).

However, in the present researcher’s view, no study has examined the combined impact of emissions, effluents and waste management disclosure on market value of oil and gas companies quoted in the Nigerian Exchange Group (NGX). Griffin et al (2017) and Bogdan, et al (2022) conducted studies in this area, however, their studies were not in Nigeria. Okeke, Ifunieze and Nwadiaro (2021) examined the effect of effluents and waste treatment cost disclosure on economic value added of quoted oil and gas firms in Nigeria. The study omitted emission and the dependent variable was Economic value Added (EVA), not market value. Finally, this study fills this research gap that stems from proxies used to examine the effect of emissions, effluents and waste management disclosure on market value.

The aim of this research is to evaluate the impact of environmental accounting disclosure on the market value of listed oil and gas firms in Nigeria. Specifically, this study seeks to:

1. Examine the impact of emissions and effluents disclosure on the market value of oil and gas firms in Nigeria.

2. Assess the effect of waste management disclosure on the market value of oil and gas firms in Nigeria.

Based on the research objectives, the following hypotheses have been formulated in the null form:

H01: Emissions and effluents disclosure does not significantly impact the market value of oil and gas firms in Nigeria.

H02: Waste management disclosure does not significantly affect the market value of oil and gas firms in Nigeria.

The rest of the paper is organized in 5 sections. Section 2 is the literature while section 3 focuses on methodology. Section 4 analyses data and discusses results. Section 5 ends with conclusion and recommendations.

**2.0 LITERATURE REVIEW**

**2.1 Greenhouse Gas Characteristics Disclosure**

Greenhouse Gas (GHG) characteristics refer to the key elements, attributes, and measurable indicators related to the emissions of gases that trap heat in the Earth’s atmosphere, contributing to global warming (Lee, et al., 2024). These characteristics are central to understanding the environmental impact of organizational activities, particularly in industries with high carbon footprints like oil and gas. According to Filonchyk, et al (2024), GHG characteristics encompass the measurement and disclosure of emissions such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), alongside operational activities that influence the release of these gases. The authors highlight that GHG characteristics are instrumental in demonstrating a firm’s environmental stewardship and compliance with international sustainability standards. Jonas, et al. (2019) defined GHG characteristics as the systematic identification, quantification, and reporting of greenhouse gases emitted during production processes. Their definition emphasizes the importance of tracking emissions through verifiable data to inform stakeholders about an organization’s environmental performance and its efforts to mitigate climate change. Julansa, Zuraida & Diantimala (2020) describe GHG characteristics as comprising emissions-related disclosures that include energy use, effluents, and waste management. Their conceptualization expands beyond emissions to incorporate waste management practices, viewing them as essential in reducing a firm’s overall environmental impact.

**2.1.2 Emissions and Effluents Disclosure**

Emissions and effluents disclosure entails reporting greenhouse gas emissions and other pollutants a company discharges into the environment (Akbaş & Canikli, 2018). This disclosure is critical, particularly in the oil and gas sector, where operations can result in significant emissions affecting the environment and public health. Arena, Bozzolan, and Michelon (2014) define emissions and effluents as pollutants released into the air, water, or land from industrial activities, particularly those with significant environmental impacts like oil and gas operations. Salawu et al. (2021) describe emissions as gases, such as carbon dioxide and methane, contributing to air pollution and climate change, while effluents refer to liquid waste discharged into water bodies, affecting water quality and ecosystems. Okwudili (2020) considers emissions and effluents as industrial by-products that, if poorly managed, cause environmental degradation and risks to public health.

Effluents, according to Kadirvelu et al. (2001), are liquid waste containing hazardous substances such as sodium, calcium, sulphate, and heavy metals, posing risks to soil, groundwater, and biodiversity. Ahmad and Hossain (2015) describe emissions as gaseous by-products like carbon and methane that contribute to greenhouse gas accumulation and climate change, underscoring their global environmental implications. Emission and effluent disclosure involves reporting pollutants released into air and water to showcase mitigation efforts and regulatory compliance, especially in the oil and gas sector, a major greenhouse gas emitter (Egbunike & Tarilaye, 2017).

In this study, emissions and effluents disclosure refers to the extent to which the oil and gas companies disclose information about pollutants or harmful substances released into the environment, such as gases, chemicals, and wastewater. Companies are expected to report their environmental performance regarding emissions into the air, water, or land. As noted by Ofoegbu & Onyebuenyi (2022), the disclosure is often based on regulatory requirements or voluntary environmental initiatives, and it demonstrates a company's commitment to reducing environmental harm.

**2.1.3 Waste Management Disclosure**

Waste management involves identifying materials, categorizing and separating them, processing reusable components, and properly discarding residual waste (Amasuomo & Baird, 2016). It encompasses the collection, transportation, treatment, and disposal of waste, with strategies like recycling, reuse, and recovery aimed at reducing landfill use, conserving resources, and enhancing sustainability (Abrahamse & Matthies, 2012). Kornom-Gbaraba and Chukwuemeka (2022) define waste management disclosure as reporting practices on waste generation, handling, and disposal, reflecting environmental responsibility. Similarly, Derefaka (2014) views it as the public communication of waste management strategies aimed at minimizing environmental harm in industries such as oil and gas. Amin, Abdulraufa and Isiaq (2024) explain it as providing detailed information on waste reduction efforts, legal compliance, and innovations like energy recovery.

Ramos (2024) highlights waste management disclosure as transparency in reporting waste disposal practices and recycling rates to meet global sustainability standards. EL-Pateh (2024) considers it systematic documentation of waste-related data to ensure regulatory compliance and build trust. Bogdan et al. (2022) focus on measurable information about efforts to mitigate ecological risks from waste by-products. Wang et al. (2023) position waste management disclosure as showcasing contributions to the circular economy and sustainable development through innovative techniques. Almaqtari et al. (2023) emphasize its role in detailing strategies to minimize ecosystem and public health harm, while Adler et al. (2022) describe it as an integral part of corporate reporting that demonstrates commitment to sustainable waste management and ethical practices.

In essence, waste management refers to the systematic process of collecting, transporting, treating, and disposing of waste materials, with an emphasis on strategies such as prevention, recycling, reuse, and recovery. These approaches aim to reduce landfill reliance, conserve natural resources, and save energy, thereby promoting more sustainable resource use. This study defines waste management disclosure as the information companies provide about their waste management practices. This includes details on waste reduction, recycling initiatives, treatment methods, and responsible disposal processes, highlighting how oil and gas firms mitigate environmental impacts and contribute to sustainable waste management practices.

**2.1.4**  **Market Value**

Damodaran (2012) defines market value as the price at which an asset or company can be bought or sold in a competitive market, reflecting investors' collective judgement of its future prospects. Fama and French (1992) describe it as the total value of a firm's equity, calculated by multiplying the share price by outstanding shares. Brealey, Myers, and Allen (2008) view market value as a measure of a company's worth, influenced by financial performance, growth potential, and economic conditions.

For the purpose of this study, market capitalization method is used. Market Value is proxied by market capitalization, calculated as the stock price multiplied by outstanding shares. Market capitalization is defined as the total value of a company's outstanding shares in the stock market, calculated by multiplying the current share price by the total number of outstanding shares. It serves as a measure of a company's market value and provides insights into its size, financial health, and investor confidence (Damodaran, 2012; Fama & French, 1992). Market capitalization is widely used in financial analysis as an indicator of a firm’s valuation and stability in the marketplace (Brealey, Myers, & Allen, 2008).

**2.2 Theoretical Frameworks/Models**

This section outlines relevant theories that provide insight into how environmental disclosure practices influence value outcomes in the oil and gas sector.

**2.2.1 Legitimacy Theory**

Legitimacy theory, developed by Dowling and Pfeffer (1975) and expanded by Suchman (1995), posits that organizations seek legitimacy by aligning their operations with societal norms to ensure survival. Suchman describes legitimacy as a resource that firms strive to gain and maintain. In the oil and gas sector, environmental disclosure serves to demonstrate a commitment to corporate social responsibility and mitigate negative public perceptions. Deegan (2002) links environmental disclosure to legitimacy, arguing that firms use such disclosures to maintain legitimacy in industries facing environmental scrutiny.

For oil and gas firms, particularly in Nigeria, legitimacy theory is relevant due to public and regulatory pressures concerning environmental impacts. By disclosing environmental information, firms attempt to align with societal expectations and demonstrate environmental responsibility. Deegan (2002) asserts that firms not conforming to societal values risk losing legitimacy, which can harm reputation and market value. Research by Akbaş and Canikli (2018) indicates that larger firms are more sensitive to environmental disclosures to maintain legitimacy, suggesting that Nigerian firms may similarly engage in environmental disclosures to protect or enhance market value. However, the theory's applicability is complicated by Nigeria's less stringent regulatory environment and the socio-political context, which may influence corporate behavior and perceptions of legitimacy.

**2.2.2 Stakeholder Theory**

Stakeholder theory, pioneered by Freeman (1984), asserts that firms must consider the interests of various stakeholders, including shareholders, employees, and the broader society. This theory highlights the importance of transparent communication, where environmental disclosures become a critical tool for maintaining stakeholder trust and meeting expectations. In the oil and gas industry, environmental impacts are of significant concern to stakeholders such as local communities and government bodies. Firms engage in environmental disclosure to build trust and demonstrate social responsibility. Emeka-Okoli et al. (2024) note that transparent environmental practices enhance stakeholder relationships and ultimately improve market value. In Nigeria, environmental disclosures can help firms manage relationships with local communities affected by issues like oil spills. However, the limited regulatory enforcement and public awareness of environmental issues may restrict the theory’s effectiveness, resulting in reduced pressure on firms to provide comprehensive disclosures.

**2.2.3 Signaling Theory**

Signaling theory, introduced by Spence (1973), explores how one party conveys information to another to reduce information asymmetry. Firms use signals, such as environmental disclosures, to convey their quality and ethical standards to external parties (Connelly et al., 2011). For oil and gas firms, robust environmental disclosures serve to differentiate themselves from competitors and assure investors of their commitment to managing environmental risks. In Nigeria, where the oil and gas industry faces scrutiny, firms can use environmental disclosures to signal their sustainability practices to investors. Strong disclosures may attract socially responsible investment and enhance global reputations. However, limited regulatory enforcement may allow firms to engage in "greenwashing," undermining the credibility of their disclosures and signaling theory's effectiveness.

**2.2.4 Institutional Theory**

Institutional theory, developed by DiMaggio and Powell (1983), posits that firms' behaviors are shaped by institutional frameworks, including regulatory bodies and societal expectations. In the oil and gas sector, compliance with environmental disclosure requirements may stem from the need to conform to both national regulations and international standards. Among the theories reviewed, Legitimacy Theory is most applicable to this study. The theory is particularly relevant because it emphasizes how firms align their practices, including environmental disclosures, with societal expectations to maintain legitimacy. In the context of the Nigerian oil and gas sector, where there is significant public and regulatory pressure regarding environmental impacts, greenhouse gas disclosures and waste management disclosures can help firms gain or maintain legitimacy. This, in turn, can positively influence their market value, making Legitimacy Theory the most fitting framework for understanding how environmental accounting disclosures impact market value in this sector.

**2.3 Empirical Review**

The empirical review examines various studies on Greenhouse Gas emissions, effluents, waste management and their impact on the value of oil and gas firms. Akbaş and Canikli (2018) investigated the determinants of greenhouse gas (GHG) emission disclosures in Turkish firms. The study’s sample included 84 listed companies, and logistic regression was employed to analyses the data. The study found that firm size, institutional ownership, and market value positively influenced GHG disclosure, while board size had a negative impact. While the findings are insightful, the study's focus on Turkey may limit its applicability to Nigeria due to different regulatory environments and market dynamics. Expanding the research to include other developing countries or sectors like oil and gas could provide more comprehensive insights.

Uniamikogbo and Ifeanyichukwu (2021) examined the relationship between environmental accounting disclosures and financial performance in Nigerian manufacturing firms. The study sampled 40 firms listed on the Nigerian Stock Exchange over the period 2010–2019. Using regression analysis, the study found that environmental disclosures positively impacted key financial indicators like share price and return on assets. This study is relevant for oil and gas firms, offering insights into the financial effects of environmental transparency. However, a deeper exploration of specific environmental disclosures could provide more targeted insights for the oil and gas sector. Ofoegbu and Onyebuenyi (2022) analyzed the impact of environmental sustainability disclosure on the financial performance of oil and gas firms in Nigeria, Namibia, and Kenya. The sample included 15 firms, and the study used content analysis based on the Global Reporting Initiative (GRI) standards, applying robust least squares regression. The study found mixed results, with some environmental disclosures positively impacting performance, while others had negative effects. Although the cross-regional approach adds depth, the focus on other countries limits the generalizability of the findings to Nigeria.

Onyebuenyi (2023) explored the relevance of environmental sustainability disclosures, particularly carbon emissions, in Nigerian oil and gas firms. Using convenience sampling, the study focused on firms with available carbon emissions data from 2006 to 2020. Robust least square regression analysis was applied to test the hypotheses. The results revealed poor carbon emissions reporting and negative investor reactions to such disclosures. The study's reliance on historical data limits its relevance to current investor expectations. A more current and detailed examination of the evolving nature of environmental disclosures would be valuable.

Okeke, Ifurueze, and Nwadiaro (2021) studied the impact of effluent and waste treatment cost disclosures on the economic value added (EVA) of Nigerian oil and gas firms, using a sample from the Nigerian Stock Exchange for the years 2018–2019. The technique of data analysis was Panel Least Squares (PLS) regression. The study found that effluent and waste treatment cost disclosure had a significant impact on economic value added (EVA), while revenue growth also had a positive effect. However, firm size did not significantly influence EVA. The short time frame and focus on EVA as the sole performance measure limit the generalizability of the findings, suggesting the need for a longer study period and a broader range of performance metrics.

Kornom-Gbaraba and Chukwuemeka (2022) investigated waste management cost disclosures and corporate financial performance among nine quoted Nigerian oil companies over a ten-year period (2010–2020), using purposive sampling to select companies based on available data. The authors employed descriptive statistics and regression analysis to evaluate the relationship between waste management cost disclosure and corporate performance. The study found a negative and insignificant relationship between waste management cost disclosure and corporate performance, raising questions about the effectiveness of transparency in environmental practices. Although the study offers valuable insights into Nigerian practices, the unexpected negative findings require further investigation.

**3.0 METHODOLOGY**

This study adopts a quantitative research design to examine the impact of emissions and waste management disclosures on the market value of oil and gas firms in Nigeria. The ex-post facto design is suitable for analyzing historical data (Creswell and Creswell, 2018; Pwagusadi, 2024). The analysis relies on secondary data from the annual reports of oil and gas companies covering 2015–2023. The population consists of nine oil and gas companies listed on the Nigerian Exchange Group (NGX) as of December 31, 2023. These include Caverton Offshore Support Group, Conoil, Eterna, Japaul Gold and Ventures, MRS Oil Nigeria, Oando, Seplat Energy, Total Energies Marketing Nigeria, and Rak Unity Petroleum (Nigerian Exchange Group, 2024). Using purposive sampling, five companies were selected for their substantial environmental disclosures, enhancing the validity of the findings (Palinkas et al., 2015; Campbell et al., 2020)

The study used secondary data sourced from the Nigeria Exchange Group Fact Book and the annual reports of listed oil and gas companies. Key environmental disclosure indicators include emissions, effluents, waste management, environmental expenditure, stakeholder engagement, and market capitalization. The data collection follows the Environmental Disclosure Index from the Global Reporting Initiative (GRI) Standards, specifically GRI 11.1–11.7 indices on environmental impact (Solsbach et al., 2014; Kaoje et al., 2024). Content analysis was employed to systematically extract and quantify environmental data, ensuring a rigorous and objective review of the disclosures

Descriptive statistics summarized the characteristics of the data, highlighting central tendencies and variability in environmental disclosures. Correlation analysis explored relationships between environmental disclosures (e.g., emissions, waste management) and market value (Aliyu-Saleh et al., 2022). Multivariate regression analysis assessed how disclosure practices influence market value, identifying significant predictors (Okeke, Ifurueze & Nwadiaro, 2021). Statistical analysis was conducted using Jamovi software (Version 2.3.28), chosen for its user-friendly interface and robust capabilities in descriptive and regression analysis (Şahin & Aybek, 2020).

**3.1 Model Specification**

The functional relationship in equation (i) expresses the idea that the market capitalization (MCAP) of a firm is a function of emissions and effluents disclosure (EED) and waste management disclosure (WMD). The multiple regression model is as follows:

MCAP = f(EED, WMD) ………………………..(i)

Where:

MCAP represents the market capitalization of the firm, which serves as the dependent variable.

EED stands for Emissions and Effluents Disclosure.

WMD stands for Waste Management Disclosure.

To further specify the model in a linear form for empirical testing, the following equation is used:

MCAPit=β0+β1EEDit+β2WMDit+ϵit ……………..(ii)

Where:

MCAPit = Market capitalization of firm i at time t (the dependent variable)

β₀ = Intercept

β₁, β₂, = Coefficients for the independent variables, measuring their impact on market capitalization

EEDᵢₜ = Emissions and Effluents Disclosure for firm i at time t

WMDᵢₜ = Waste Management Disclosure for firm i at time t

εᵢₜ = Error term for firm i at time t,

i represents the individual firm (cross-sectional unit) in the sample

t represents time, indicating the specific time period

**3.2 Description and Measurement of Variables**

The following firm-specific dependent and independent variables were included in the model.

**Table 1: List of variables, definitions and measurements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Description** | **Measurement** | **Source** | **Validated Literature/Studies** |
| Market Capitalization **(MCAP)** | The total market value of the firm's outstanding shares | Billions (Naira) = Current stock price × Number of outstanding shares. | Annual Reports; Nigeria Exchange Group Fact Book. |  Omodero (2019); Aliyu-Saleh et al. (2022). |
| Emissions and Effluents Disclosure **(EED)** | Pollutants released into the air, water, or land that affect the environment. | Emissions reported by firms (CO2) recorded, and coded based on the Global Reporting Initiative (GRI) standards. | Annual Reports (Environmental Reports segment) | Ayuba & Yunusa (2023**);**Okeke, Ifurueze & Nwadiaro, 2021). |
| Waste Management Disclosure **(WMD)** | Treatment of waste generated from operations to minimize environmental impact. | Percentage of waste recycled (%) | Sustainability Reports | Ahakiri et al. (2023); Omole, Isiorho & Ndambuki (2016)  |

Source: Researcher’s Compilation (2024)

**4. DATA ANALYSIS**

**4.1 Descriptive Statistics**

In this section, descriptive statistics were calculated for the dataset based on key parameters, providing valuable insights into the data's distribution and central tendencies.

| **Table 2: Descriptive Statistics of the variables** |
| --- |
|  | **EED** | **WMD** | **MCAP** |
| N |  | 45 |  | 45 |  | 45 |  |
| Missing |  | 0 |  | 0 |  | 0 |  |
| Mean |  | 52110 |  | 0.245 |  | 84.5 |  |
| Median |  | 61407 |  | 0.240 |  | 18.1 |  |
| Standard deviation |  | 22717 |  | 0.105 |  | 148 |  |
| Minimum |  | 100 |  | 0.0800 |  | 3.02 |  |
| Maximum |  | 93111 |  | 0.500 |  | 820 |  |
| Skewness |  | -1.40 |  | 0.391 |  | 3.25 |  |
| Std. error skewness |  | 0.354 |  | 0.354 |  | 0.354 |  |
| Kurtosis |  | 1.16 |  | -0.662 |  | 13.3 |  |
| Std. error kurtosis |  | 0.695 |  | 0.695 |  | 0.695 |  |
| Shapiro-Wilk W |  | 0.770 |  | 0.961 |  | 0.584 |  |
| Shapiro-Wilk p |  | < .001 |  | 0.138 |  | < .001 |  |
|  |

 Source: Jamovi Output

The descriptive statistics reveal key insights about the variables.

**Emissions and Effluent Disclosure (EED)** has a mean of 52,110, with substantial variability (SD = 22,717) and a left-skewed distribution (skewness = -1.40). This shows a high mean with left skewness, indicating that while many companies report moderate emissions and effluents, a few report significantly lower figures, reflecting varying commitments to sustainability.

**Waste Management Disclosure (WMD)** has a mean of 0.245 and shows moderate variation (SD = 0.105), with a nearly normal distribution. This demonstrates moderate reporting consistency, with a mean of 0.245.

**Market Capitalisation (MCAP)** exhibits high variability, with a mean of 84.5, a large SD of 148, and significant right skewness (skewness = 3.25), indicating suggesting that a few firms dominate the market, which may influence investor perceptions based on environmental reporting.

The Shapiro-Wilk test confirms non-normal distributions for EED and MCAP (p < .001), while WMD follows a normal distribution. The non-normal distributions of EED and MCAP indicate that regression analysis will be crucial for accurately assessing the relationships between these variables.

### 4.2 Correlation Matrix

Correlation analysis is a statistical technique used to evaluate the strength and direction of the relationships among two or more variables (Field, 2013)

| **Table 3: Correlation Matrix** |
| --- |
|  |  | **EED** | **WMD** | **MCAP** |
| EED |  | Pearson's r |  | — |  |  |  |  |  |
|   |  | df |  | — |  |  |  |  |  |
|   |  | p-value |  | — |  |  |  |  |  |
| WMD |  | Pearson's r |  | 0.198 |  | — |  |  |  |
|   |  | df |  | 43 |  | — |  |  |  |
|   |  | p-value |  | 0.193 |  | — |  |  |  |
| MCAP |  | Pearson's r |  | -0.203 |  | 0.299 |  | — |  |
|   |  | df |  | 43 |  | 43 |  | — |  |
|   |  | p-value |  | 0.181 |  | 0.046 |  | — |  |
|  |

 Source: Jamovi Output

The correlation matrix reveals the following relationships:

**EED and MCAP** have a weak negative correlation (r = −0.203, p = 0.181), indicating that higher emissions and effluent disclosures may be associated with lower market capitalization, though this is not statistically significant.

**WMD and MCAP** show a moderate positive correlation (r = 0.299, p = 0.046), suggesting that better waste management disclosures are linked to higher market capitalization, with this relationship being statistically significant.

### 4.3 Test of Hypotheses

To test the hypotheses, regression analysis was conducted to determine the influence of emission and effluents disclosure and waste management disclosure on market capitalisation. Results are presented in Tables 4 and 5.

| **Table 4: Model Fit Measures** |
| --- |
|  | **Overall Model Test** |
| **Model** | **R** | **R²** | **Adjusted R²** | **F** | **df1** | **df2** | **p** |
| 1 |  | 0.401 |  | 0.161 |  | 0.121 |  | 4.02 |  | 2 |  | 42 |  | 0.025 |  |
| Note. Models estimated using sample size of N=45 |
|  |

 Source: Jamovi Output

The model fit measures indicate the overall effectiveness of the regression model in explaining the variation in market capitalisation (MCAP) as a result of emissions and effluent disclosure (EED) and waste management disclosure (WMD). The model shows a moderate positive relationship (R = 0.401) between environmental disclosures (EED and WMD) and market capitalisation (MCAP). The R² value of 0.161 indicates that 16.1% of the variation in MCAP is explained by these disclosures. The adjusted R² of 0.121 suggests a modest explanatory power. With an F-statistic of 4.02 and a p-value of 0.025, the model is statistically significant, confirming that environmental disclosures have a notable, though modest, influence on the market value of oil and gas companies.

| **Table 5: Model Coefficients - MCAP** |
| --- |
| **Predictor** | **Estimate** | **SE** | **t** | **p** |
| Intercept |  | 55.48822 |  | 66.0 |  | 0.841 |  | 0.405 |  |
| EED |  | -0.00178 |  | 9.42e-4 |  | -1.890 |  | 0.066 |  |
| WMD |  | 496.52459 |  | 203.1 |  | 2.444 |  | 0.019 |  |
|  |

 Source: Jamovi Output

The model coefficients suggest that emissions and effluent disclosure (EED) has a negative but statistically insignificant effect on market capitalization (MCAP), with an estimate of -0.00178 (p = 0.066). This implies that as EED increases, MCAP tends to decrease slightly, but the relationship is weak. Hypothesis 1 (Ho1) which states that *emissions and effluents disclosure does not significantly impact the market value of oil and gas firms in Nigeria* is therefore accepted.

On the other hand, waste management disclosure (WMD) has a positive and statistically significant effect on MCAP, with an estimate of 496.52 (p = 0.019). This indicates that higher levels of WMD are associated with an increase in the market value of oil and gas companies. Hypothesis 2 (Ho2) which states that *waste management disclosure does not significantly affect the market value of oil and gas firms in Nigeria* is therefore rejected.

| **Table 6: Durbin–Watson Test for Autocorrelation** |
| --- |
| **Autocorrelation** | **DW Statistic** |  **p** |
| 0.459 |  | 1.05 |  | 0.002 |  |
|  |

 Source: Jamovi Output

The Durbin–Watson test indicates moderate positive autocorrelation in the residuals, with an autocorrelation value of 0.459 and a DW statistic of 1.05, which is below the threshold of 2. The p-value of 0.002 confirms that the autocorrelation is statistically significant.

| **Table 7: Collinearity Statistics** |
| --- |
|  |  **VIF** |  **Tolerance** |
| EED |  | 1.04 |  | 0.961 |  |
| WMD |  | 1.04 |  | 0.961 |  |
|  |

Source: Jamovi Output

The collinearity statistics reveal no significant multicollinearity among the variables, as the Variance Inflation Factor (VIF) values for Emissions and Effluents Disclosure (EED) and Waste Management Disclosure (WMD) are 1.04, well below the critical threshold of 10. The corresponding tolerance values of 0.961 indicate a high level of independence between the predictors, further confirming that multicollinearity is not a concern in the model.

### 4.4 Discussion of Findings

The study found that emissions and effluent disclosure has a negative and statistically insignificant effect on market capitalization while waste management disclosure has a positive and statistically significant effect on market value. The findings supports previous research by demonstrating that waste management disclosure (WMD) positively affects the market value of oil and gas firms. This finding aligns with Okeke et al. (2021), who found a similar positive impact of waste management disclosures on firm value in Nigeria. In contrast, emissions and effluents disclosure (EED) was found to have a negative and statistically insignificant effect on market capitalization, which resonates with some studies, such as Kornom-Gbaraba and Chukwuemeka (2022) and Onyebuenyi (2023), suggesting that Nigerian investors may perceive emissions disclosures negatively due to associated costs.

Legitimacy theory posits that firms disclose environmental information to align with societal expectations (Suchman, 1995). The positive association between waste management disclosure (WMD) and market value supports this theory, as firms aim to enhance their legitimacy by demonstrating environmental responsibility (Okeke et al., 2021). While emissions and effluents disclosure (EED) also aligns with this theory, its negative relationship suggests that firms may not effectively communicate their environmental efforts, leading to less legitimacy (Onyebuenyi, 2023). According to stakeholder theory, firms disclose information to satisfy stakeholder expectations (Freeman, 1984). The robust relationship between waste management disclosure (WMD) and market value illustrates how firms are responding to heightened environmental concerns (Okeke et al., 2021). Conversely, the weak effect of emissions and effluents disclosure (EED) may reflect its reduced immediate relevance to stakeholders, despite the enduring importance of transparency in this area (Kornom-Gbaraba and Chukwuemeka, 2022).

Signaling theory frames the positive effect of waste management disclosure as a proactive indicator of a firm’s commitment to sustainability, thereby boosting investor confidence. Although emissions and effluents disclosure was found to have a negative impact, it may convey a less direct signal of commitment due to its lower perceived value among investors. Finally, institutional theory interprets these disclosures as responses to regulatory and social pressures. Oil and gas firms in Nigeria seem to benefit from fulfilling these institutional expectations through transparent reporting, particularly concerning waste management. However, as highlighted by Osayabor and Izedonmi (2023), superficial disclosures can harm market perceptions, emphasizing the necessity for comprehensive and substantive reporting.

**5. CONCLUSION AND RECOMMENDATIONS**

The study concludes that emissions and effluent disclosure has a negative and statistically insignificant effect on market value while waste management disclosure has a positive and statistically significant effect on market value of oil and gas companies in Nigeria. The empirical results specifically indicated that emissions and effluents disclosure has a negative and statistically insignificant effect on market capitalization, suggesting that as such disclosures increase, the market value may slightly decline. In contrast, waste management disclosure reported a positive and significant influence on market capitalization, indicating that higher levels of waste management transparency are associated with an increase in the market value of oil and gas companies.

In light of the findings, the study recommends as follows:

1. Management and Board of the oil and gas firms should strive for comprehensive and transparent reporting on emissions and effluents. Increasing the quality and detail of these disclosures may help to build investor trust and improve market perceptions.
2. Given the positive impact of WMD on market value, oil and gas companies should prioritize and promote their waste management initiatives. This can be achieved through dedicated reporting and showcasing successful waste management strategies to attract investors.
3. Oil and gas firms in Nigeriashould regularly assess their environmental disclosure strategies to ensure they remain relevant and effective in communicating their sustainability efforts to investors.
4. Oil and gas firms should look to industry best practices for environmental reporting, drawing from successful case studies both locally and globally, to enhance their own disclosure frameworks.

**REFERENCES**

Abrahamse, W. & Matthies, E, (2012) Informational strategies to promote pro-environmental behaviour: changing knowledge, awareness and attitudes. In: Steg L, van den Berg AE, de Groot JIM (eds) *Environmental psychology*: An introduction. Wiley, Hoboken, 223– 232.

Adegbie, F. F., Ogidan, A. A., Siyanbola, T. T., & Adebayo, A. S. ( 2020). Environmental accounting practices and share value of food and beverages manufacturing companies quoted in Nigeria*. Journal of Critical Reviews*,7(13), 2256-2264.

Adler, R., Mansi, M., & Pandey, R. (2022). Accounting for waste management: A study of the reporting practices of the top listed Indian companies. *Accounting & Finance,*62(2), 2401 -2437. <https://doi.org/10.1111/acfi.12869>

Ahakiri, 1.F., Imong, N.R. & Ogar-Abang, J. (2023). Effect of environmental accounting disclosure on firm profitability of listed oil and gas companies in Nigeria. *CNAJ*, 31 (3), 1-18 <https://www.cnaj.anan.org.ng/article-details.php?article=3>

Ahmad, N. N. N., & Hossain, D. M. (2015). Climate change and global warming discourses and disclosures in the corporate annual reports: a study on the Malaysian companies. *procedia -* *Social and Behavioural Sciences,* 172, 246–253. https://doi.org/10.1016/j.sbspro.2015.01.361

Akeju, F.B. & Oguntimein, G. (2023). Environmental impact of oil exploration in Nigeria: a case study of Nembe local government. *International Journal of Research and Innovation in Applied Science*. VIII(IX). 75-89. <https://doi.org/10.51584/IJRIAS.2023.8910>

Akbaş, H. E., & Canikli, S. (2018). Determinants of voluntary greenhouse gas emission disclosure: an empirical investigation on Turkish Firms. *Sustainability*, 11(1), 107. <https://doi.org/10.3390/su11010107>

Aliyu-Saleh, M., Bappah, S., Daniel Orsaa, G., & Adamu-Saleh, I. (2022). Environmental sustainability disclosure and market value of listed oil and gas firms in Nigeria. *Gusau Journal of Accounting and Finance,* 3(1), pp.22 – 34.

Almaqtari, Faozi & Elsheikh, Tamer & Hashim, Hafiza & Youssef, Mayada. (2024). Board attributes and environmental and sustainability performance: Moderating role of environmental teams in Asia and Europe. *Sustainable Futures*. 7. 100149. https://doi.org/10.1016/j.sftr.2023.100149.

Amasuomo, Ebikapade & Baird, Jim. (2016). Solid Waste Management Trends in Nigeria. *Journal of Management and Sustainability*. 6. 35. https://doi.org/10.5539/jms.v6n4p35

Amin, A., Abdulraufa, A. & Isiaq, A.T. (2024). Strategies for the implementation of environmental protection regulations towards sustainable waste management in Oyo State. *Gusau international journal of management and social sciences*. 7(2), 83-104. <https://doi.org/10.57233/gijmss.v7i2.05>

Arena, C., Bozzolan, S. & Michelon, G. (2014). Environmental reporting: transparency to stakeholders or stakeholder manipulation? an analysis of disclosure tone and the role of the board of directors. *Corporate Social Responsibility and Environmental Management.* 22(6),1-56. <https://doi.org/10.1002/csr.1350>

Ayuba, T. & Yunusa, G. (2023). Impact of environmental and social disclosure on return on asset of listed oil and gas companies in Nigeria. *International Journal of Finance and Accounting,* 8(1), 23–35. <https://doi.org/10.47604/ijfa.1778>

Azuazu, I. N., Sam, K., Campo, P., & Coulon, F. (2023). Challenges and opportunities for low- carbon remediation in the Niger Delta: Towards sustainable environmental management. *Science of The Total Environment*, 900, 165739. <https://doi.org/10.1016/j.scitotenv.2023.165739>

Brealey, R. A., Myers, S. C., & Allen, F. (2008). Principles of corporate finance (9th ed.). McGraw-Hill Education.

Bogdan, V., Sabău-Popa, C. D., Boloș, M. I., Popa, D. N., & Beleneși, M. (2022). Tracking waste management information disclosure behaviour connected to financial performance through moderating variables. *International journal of environmental research and public health,* 19(20), 13068. https://doi.org/10.3390/ijerph192013068.

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing: JRN*, 25(8), 652-661. <https://doi.org/10.1177/1744987120927206>

Chopra, S. S., Senadheera, S. S., Dissanayake, P. D., Withana, P. A., Chib, R., Rhee, J. H., & Ok, Y. S. (2023). Navigating the challenges of environmental, social, and governance (ESG) reporting: the path to broader sustainable development. *Sustainability*, 16(2), 606. <https://doi.org/10.3390/su16020606>

Connelly, B., Certo, T., Ireland, R. & Reutzel, C. (2011). Signalling theory: a review and assessment. *Journal of Management.* 37(1). 39-67. https://doi.org/10.1177/0149206310388419.

Creswell, J.W. and Creswell, J.D. (2018). Research design: qualitative, quantitative, and mixed methods approaches. Sage, Los Angeles.

Damodaran, A. (2012). Investment valuation: Tools and techniques for determining the value of any asset. Wiley.

Dharma, F., Marimutu, M. & Alvia, L. (2024). Profitability and market value effect on carbon emission disclosures: the moderating role of environmental performance. *International Journal of Energy Economics and Policy.* 14(3), pp. 463-472. <https://doi.org/10.32479/ijeep.15915>

Deegan, C. (2002). The Legitimising Effect of Social and Environmental Disclosures – *A Theoretical Foundation. Accounting, Auditing & Accountability Journal.* 15(3), pp. 282- 311. <https://doi.org/10.1108/09513570210435852>

Derefaka, Justice. (2014). Waste Management Challenges in the Oil & Gas Industry with Special Focus on Limited Disposal Infrastructures: Shell Companies in Nigeria (SCiN) Challenges and Lessons Learnt. <https://doi.org/10.13140/RG.2.1.2184.2965>

DiMaggio, P.J. and Powell, W.W. (1983) The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(1), pp.147-160. <https://doi.org/10.2307/2095101>

Dowling, J. and Pfeffer, J. (1975) Organizational Legitimacy: Social Values and Organizational Behaviour. *Pacific Sociological Review*, 18(1), 122-136. <https://doi.org/10.2307/1388226>

El-Pateh, S.J. (2024). an assessment of stakeholders’ compliance to the waste management of electrical and electronic equipment guidelines in Bauchi State, Nigeria. *Nigerian Journal of Tropical Engineering*. 18(3), 253-265. <https://doi.org/10.59081/njte.18.3.001>

Egbunike, P.A & Tarilaye, N. (2017). Firm's specific attributes and voluntary environmental disclosure in Nigeria: evidence from listed manufacturing companies. *Academy of accounting and financial studies journal.* 21(3), 1-9. <https://www.abacademies.org/articles/firms-specific-attributes-and-voluntary> environmental-disclosure-in-nigeria-1528-2635-21-3-132.pdf

Emeka-Okoli, S., Nwankwo, T., Otonnah, C. & Nwankwo, E. (2024). Effective stakeholder relationship management in the oil & gas sector: a conceptual and review perspective. *Finance & Accounting Research Journal*. 6(3), pp. 372-383. https://doi.org/10.51594/farj.v6i3.898.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. The Journal of Finance, 47(2), 427-465.

Filonchyk, M., Peterson, M. P., Zhang, L., Hurynovich, V., & He, Y. (2024). Greenhouse gases emissions and global climate change: Examining the influence of CO2, CH4, and N2O. *The Science of the total environment*, 935, 173359. <https://doi.org/10.1016/j.scitotenv.2024.173359>

Freeman, R.E., Harrison, J.S. & Zyglidopoulos S. (1984). Stakeholder theory: concepts and strategies. *Cambridge University Press*.

Gbenga, E. & Josiah, M. (2020). Environmental accounting disclosure: a critical examination of literature. *International Journal of Economics Finance and Management Sciences*. 17(2). 34-45.

Griffin, P. A., Lont, D. H., & Sun, E. Y. (2017). The relevance to investors of greenhouse gas emission disclosures. *Contemporary Accounting Research*, 34(2), 1265-1297. <https://doi.org/10.1111/1911-3846.12298>

Igbekoyi, O., Solanke, F., Adeusi, S., Alade, M. & Agbaje, W. (2022). Environmental accounting disclosure and financial performance of listed multinational firms in Nigeria. Global *Journal of Management and Business Research*. 21(2), pp. 17-28. <https://doi.org/10.34257/GJMBRDVOL21IS2PG17>.

International Energy Agency (IEA). (2021). CO2 emissions – *Global Energy Review 2021* – Analysis. Retrieved from: [https://www.iea.org/reports/global-energy-review-2021/co2 emissions](https://www.iea.org/reports/global-energy-review-2021/co2%09emissions)

Julansa, H., Zuraida, & Diantimala, Y. (2020). The Effect of Gas Emission Disclosure, Solid Waste Disclosure, and Effluent Disclosure on Firm Value. International Journal of Academic *Research in Business and Social Sciences,* 10(6), 449–475. <https://doi.org/10.6007/IJARBSS/v10-i6/7315>

Kadirvelu, K., Thamaraiselvi, K., & Namasivayam, C. (2001). Removal of heavy metals from industrial wastewaters by adsorption onto activated carbon prepared from an agricultural solid waste. *Bioresource Technology*, 76, 63–65.

Kaoje, N.A., Olanrewaju, O.J., Mohammed, N.M. & 1 Ruggah, H.H. (2024). Firm characteristics and environmental disclosure of listed oil and gas marketing companies in Nigeria. *LAPAI* *International Journal of Management and Social Sciences*, 16(1), 278-292.

KPMG (2022). Survey of Sustainability Reporting 2022. Retrieved from: [https://assets.kpmg.com/content/dam/kpmg/se/pdf/komm/2022/Global-Survey-of Sustainability-Reporting-2022.pdf](https://assets.kpmg.com/content/dam/kpmg/se/pdf/komm/2022/Global-Survey-of%09Sustainability-Reporting-2022.pdf)

Kornom-Gbaraba, M.E. & Chukwemeka, J. (2022). Impact of waste management cost disclosure on corporate financial performance of quoted oil companies in Nigeria. British *International Journal of Applied Economics, Finance and Accounting* 6(2), pp. 21-29. <https://aspjournals.org/Journals/index.php/bijaefa>

Lee, J., Jeong, S., Park, H., Hong, J., Kim, J., Frey, M. M., Morino, I., Ohyama, H., Hase, F., Mermigkas, M., Zhou, M., Té, Y., & Roehl, C. M. (2024). Emission Characteristics of Greenhouse Gases and Air Pollutants in Northern Hemisphere Cities: Comprehensive Assessment Using Ground-Based Fourier Transform Spectrometers. *Journal of Geophysical Research: Atmospheres,* 129(12), e2023JD040562. https://doi.org/10.1029/2023JD040562

McKinsey & Company (2020). The future is now: How oil and gas companies can decarbonize. Retrieved from: <https://www.mckinsey.com/industries/oil-and-gas/our-insights/the> future- is-now-how-oil-and-gas-companies-can-decarbonize

Mousa, G. & Hassan, N. (2015). Legitimacy Theory and environmental practices: short notes. *International Journal of Business and Statistical Analysis*. 2(1), pp.41-53. <https://doi.org/10.12785/ijbsa/020104>

Nigerian Exchange Group. (2024). Nigerian Exchange (NGX) - Listed Companies. African Markets. Accessed July 30, 2024 at [https://www.african-markets.com/en/stock markets/ngse/listed-companies](https://www.african-markets.com/en/stock%09markets/ngse/listed-companies)

Ofoegbu, G. & Onyebuenyi, F. (2022). Environmental sustainability disclosure and firm performance of quoted oil and gas companies in Sub-Saharan Africa Countries. 26(1). 1 - 18.

Okeke, E.E., Ifurueze, M.S. & Nwadiaro, E.O. (2021). Effect of effluent and waste treatment cost disclosure on economic value added of quoted oil and gas firms in Nigeria. *International Journal of Sustainable Development*, 6(4)78-97.

Okwudili, I.R. (2020). Environmental accounting practices and corporate performance: study of listed oil and gas companies in Nigeria. *European journal of business and management.*  12(22),pp. 58 - 70. <https://doi.org/10.7176/EJBM/12-22-08>

Olagunju, A., & Ajiboye, O. O. (2022). Environmental accounting disclosure and market value of listed non-financial firms in Nigeria. *International Journal of Management, Accounting and Economics,* 9(7), 413-430

Omodero, C. (2019). Capital Market Determinants and Market Capitalization in Nigeria. *International Journal of Financial Research*. 11(1). 462-473. <https://doi.org/10.5430/ijfr.v11n1p462>.

Omole, D.O., Isiorho, S.A., and Ndambuki, J.M. (2016), Waste management practices in Nigeria: Impacts and mitigation, in Wessel, G.R., and Greenberg, J.K., eds., *Geoscience for the Public Good and Global Development: Toward a Sustainable Future: Geological Society of America Special Paper* 520(1), pp. 377–386, [https://doi.org/10.1130/2016.2520(33)](https://doi.org/10.1130/2016.2520%2833%29).

Onyebuenyi, F.E. (2023). Value relevance of environmental sustainability information disclosure: evidence from listed oil & gas firms in Nigeria. *Fuoye Journal of Accounting and Management,* 6(3), 188-208.

Osayabor, E.F. & Izedonmi, F.P. (2023). Sustainability Disclosure and Market Value of Quoted Oil and Gas Companies in Nigeria”. ABUAD *Journal of Social and Management Sciences* 4 (2), 208-27. https://doi.org/10.53982/ajsms.2023.0402.03-j.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and policy in mental health,* 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>

Pwagusadi, J.S. (2024) Effect of environmental disclosure on market value of listed oil and gas companies in Nigeria. *International Journal of Humanities Social Science and Management* (IJHSSM), 4(4), 683-700.

Ramos, A. (2024). Sustainability assessment in waste management: An exploratory study of the social perspective in waste-to-energy cases. *Journal of Cleaner Production*, 475, 143693. <https://doi.org/10.1016/j.jclepro.2024.143693>

Şahin, M. & Aybek, E. (2019). Jamovi: an easy to use statistical software for the social scientists. 6(4), 670 - 692, <https://doi.org/10.21449/ijate.661803>

Salawu, M. A., Mamman , S., Dahiru , M. T., Ado, G., & Yunusa, N. (2021). Firm-specific attributes and environmental disclosure of listed oil and gas firms in Nigeria. *Global Journal of Accounting*, 7(1), 1-14. Retrieved from http://gja.unilag.edu.ng/article/view/1202 (19th June, 2024)

Spence, M. (1973) Job market signalling. *Quarterly Journal of Economics,* 87, 355- 374. <https://doi.org/10.2307/1882010>

Solsbach, A., Isenmann, R., Gómez, M.J. & Teuteberg, F. (2014). Inter-organisational sustainability reporting – a harmonized XRBL approach based on GRI G4 XBRL and further Guidelines. Proceedings of the 28th EnviroInfo 2014 Conference, Oldenburg, Germany.

Uniamikogbo, E. & Ifeanyichukwu, A. (2021). Environmental accounting disclosure and financial performance of manufacturing firms in Nigeria. *Journal of economics and international business management*, 9(2), 71-81.

Uwaoma, I., & Ordu, P. A. (2016). Environmental Reporting in the Oil and Gas Industry in Nigeria. *International Journal of Research in Business Studies and Management*, 3, 1-21.

Wang, L., Shang, Y., Li, S & Li, C. (2023). Environmental information disclosure- environmental costs nexus: evidence from heavy pollution industry in China," *Sustainability, MDPI*, 15(3), 1-21.