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Firm-specific characteristics and environmental disclosure of energy firms in Sub-Saharan Africa

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Abstract

Purpose: This study investigated the relationship between firm-specific characteristics and environmental disclosure practices of energy firms in sub-Saharan Africa. It examines how profitability, size, and liquidity influence the environmental disclosure index (EDI) of listed energy firms in the region.

Research methodology: A quantitative approach was adopted, utilizing secondary data from the annual reports of energy firms listed in Nigeria, South Africa, and Kenya. Regression analysis was employed to assess the impact of firm-specific characteristics on EDI using waste management data based on the Global Reporting Initiative (GRI) 306 guidelines.

Results: The findings indicated that Profitability positively affected EDI, indicating greater transparency in reporting environmental initiatives for more profitable firms. Conversely, firm size is negatively correlated with environmental disclosure, suggesting challenges for larger firms in effectively communicating their environmental efforts. However, firm liquidity did not significantly affect EDI.

Limitations: One limitation of the study is its focus on energy firms in only three countries, limiting the generalizability of the findings to other sub-Saharan African nations.

Contribution: This research contributes to the literature by addressing environmental disclosure practices within sub-Saharan Africa's energy sector, offering stakeholders, policymakers, and regulators insights to promote transparency and sustainability in the industry.

Novelty: The novelty of this study lies in its examination of firm-specific characteristics and their influence on environmental disclosure practices in the energy sector of Sub-Saharan Africa. Using waste management data as a proxy for disclosure offers a fresh perspective on the reporting practices of energy firms in the region.

Keywords: *Firm-Specific Characteristics, Environmental Disclosure, Energy Firms, Sub-Saharan Africa, Global Reporting Initiative*

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1. Introduction

Amidst the vast and diverse landscapes of sub-Saharan Africa, the energy sector has emerged as a powerful catalyst driving economic progress and development, energizing industries, homes, and communities alike. However, this relentless growth in energy demand, propelled by a burgeoning

population and expanding economies, comes hand in hand with an equally pressing challenge: environmental sustainability.

In 2021, environmental sustainability took center stage as over 40,000 people, including 120 world leaders, 22,274 party delegates, 14,124 observers, and 3,886 media representatives, gathered in Glasgow, Scotland for the United Nations Climate Change Conference (COP26). The event spanned two weeks and captivated global attention, with evidence, solutions, political will to act, and concrete signals of climate change action at the forefront of discussions (UN, 2021). Environmental disclosure has emerged as a crucial instrument at this critical juncture to address climate change and its consequences, offering valuable insights into corporate responsibility and transparency.

Environmental disclosure can be considered critical for fostering stakeholder engagement and driving the "greening" of corporate financial reports. Tukur, Shehu, Mammadi, and Sulaiman (2019) stated that a firm can carry out corporate social responsibility by involving environmental conservation and sustainability activities. According to Nweze and Nwadialor (2020), environmental disclosure entails disclosing expenses incurred by a company to preserve and enhance its local environment in its annual report. In doing so, firms become more transparent about their investments in environmental protection, particularly when these expenditures are linked to operations that negatively impact the natural world.

In light of this, Jeroh (2020) highlights the significance of listed firms in sub-Saharan Africa, especially those in the energy industry, reporting their environmental obligations to the public. Failure to do so may hinder transparency, accountability, and the acquisition of legitimacy and recognition from stakeholders. This has prompted numerous studies underlining the need for better environmental performance, disclosure standards, and further recommendations for businesses to adopt eco-friendly practices. Environmental disclosure has emerged as a central discourse in accounting literature because of the mounting pressure to fulfill many environmental obligations across various industries.

Regrettably, despite the increasing emphasis on environmental sustainability, a significant knowledge gap persists regarding the factors influencing environmental disclosure practices among sub-Saharan African energy firms. This study seeks to address this gap by investigating the relationship between firm-specific characteristics and environmental disclosure among energy firms in the region. By shedding light on these critical dynamics, this research endeavors to pave the way for enhanced environmental responsibility, transparency, and sustainable practices within the energy sector of Sub-Saharan Africa. This study considers profitability, firm size, and liquidity as proxies for firm-specific attributes, and waste management (GRI 306) as proxies for environmental disclosure.

1.1 Study Objectives

The primary aim of this research is to explore how firm-specific characteristics impact the environmental disclosure practices of energy firms listed in Sub-Saharan Africa. Specifically, this study seeks to achieve the following objectives.

1. Assess the influence of firm profitability on the environmental disclosure index (EDI) of listed energy firms in sub-Saharan Africa.
2. To examine the impact of firm size on the environmental disclosure index (EDI) of listed energy firms in sub-Saharan Africa.
3. Investigate the relationship between firm liquidity and the listed energy firms' environmental disclosure index (EDI) in Sub-Saharan Africa.

2. Literature review

2.1. Firm-specific Characteristics

Firm-specific characteristics refer to the unique and distinctive attributes that define an organization and set it apart from its competitors in the business landscape. These characteristics encompass the diverse factors that collectively shape a firm's identity, resources, and strategic capabilities. Researchers have extensively explored the concept of firm-specific characteristics in various business and management studies.

According to Gachoka, Aduda, Kaijage, and Okiro (2018), firm characteristics are qualities or identities that qualify an organization and contribute to its competitive advantage. These qualities are often associated with a firm's resources, capabilities, and organizational goals. Gachoka et al. (2018) highlight that a corporation's structural, market-related, and capital-related aspects can be used to evaluate its firm-specific characteristics. Some examples of structural characteristics include a firm's age, profitability, ownership structure, and size. Market-related characteristics include variables such as industry type and environmental uncertainty, while capital-related characteristics include liquidity and capital intensity.

The concept of firm-specific characteristics is also emphasized by Mgeni and Nayak (2016), who noted that these characteristics are closely linked to a firm's resources and strategic objectives. This study suggests that understanding a firm's unique characteristics is essential for analyzing its competitive position, growth prospects, and potential challenges in the market.

2.2. Environmental Disclosure

Environmental disclosure is a crucial concept in corporate reporting, encompassing how businesses communicate information about their environmental activities to stakeholders and users of their financial statements. As defined by Campbell (2003), this umbrella term refers to any information a company provides on how its operations impact the natural or operational environment.

Environmental disclosure involves identifying, quantifying, assigning, and integrating the costs associated with greenhouse gas emissions and other environmental impacts into a company's financial statements. According to Mgbame, Aderin, Ohalehi, and Chijoke-Mgbame (2020), it goes beyond mere financial data, extending to reporting the social costs incurred by firms due to production externalities on the environment. These costs arise directly from the environmental consequences of a firm's operations. Moreover, environmental disclosure sheds light on the extent of investment in regular intervention expenses, aiming to bridge the gap between marginal costs and total costs presented in firms' financial statements.

For a business to thrive, it must convince surrounding communities that it complies with regulations and adds value to the community (Chukwuebuka, Obiora, & Ikechukwu, 2021). Therefore, environmental disclosure is pivotal for establishing a company's environmental accountability and responsible business practices. Environmental disclosure is a deliberate effort to release pertinent information on ecological concerns, allowing stakeholders to assess a company's environmental performance and commitment to sustainability.

2.3 Firm Profitability and Environmental Disclosure

Firm profitability is a fundamental concept that measures a company's financial success and effectiveness in generating earnings from operations. This is a crucial indicator of a firm's ability to create value and generate returns for shareholders and investors. Profitability is an essential metric that is closely monitored by stakeholders, including investors, analysts, and lenders, as it provides insights into a company's financial health, sustainability, and competitiveness.

One of the most overbearing firm resources, with which environmental responsibility is often sponsored, is profit. A company's ability to publish environmental information can significantly influence its profitability. In research on the factors affecting environmental disclosure, profitability has been used as a proxy, and various findings have been made public. For instance, Jariya (2015) argued that profitability impacts environmental disclosure. Conversely, Sulaiman, Abdullah, and Fatima (2014) investigated the factors influencing the quality of environmental reporting in Malaysia. Through regression analysis, their findings showed that profitability was not significantly correlated with environmental reporting quality.

On the other hand, Aghdam (2015) finds an insignificant association between environmental disclosure and profitability. By contrast, Abubakar et al. (2017) claim that profits positively affect environmental

disclosure. These diverse findings highlight the complex relationship between profitability and environmental disclosure, with various studies providing different perspectives.

2.4 Firm Size and Environmental Disclosure

Firm size reflects the extent of a company's operations, often measured by total assets, revenue, market capitalization, or the number of employees involved. Antara, Putri, Ratnadi, and Wirawati (2020) state that firm size significantly influences environmental reporting. Hieu et al. (2019) demonstrate a positive and statistically significant correlation between company size and environmental disclosure. Brammer and Millington (2006) emphasized that large companies typically attract more public attention and face greater pressure to demonstrate environmental responsibility. Jariya (2015) found that larger firms among Sri Lankan-listed manufacturing companies were more likely to disclose information about their environmental impacts. However, contrary findings by Dibia and Onwuchekwa (2015) revealed that larger companies were less likely to disclose environmental risks, while Gatimbu and Wabwire (2016) discovered an inverse correlation between company size and environmental disclosure among publicly traded Dutch companies. In Nigeria, Abubakar et al. (2017) investigated the Influence of Firm Characteristics on Environmental Disclosure, specifically focusing on listed Brewery Companies, and found a positive but statistically insignificant association between firm size and environmental disclosure. Similarly, Mohammed and Tamoi (2006) in Malaysia linked the size of a company, represented by the log of its total assets, to variations in environmental reporting requirements among different firms. Overall, the relationship between firm size and environmental disclosure appears complex, with different studies yielding varying results.

2.5 Firm Liquidity and Environmental Disclosure

A firm's liquidity can be defined as its ability to pay off its current liability. A high level of liquidity indicates the robustness of a company's financial health and the availability of sufficient cash to disclose sustainable report information. By contrast, a low level of liquidity indicates that a company may face difficulties in meeting its short-term obligations, such as paying off debts, covering operational expenses, and investing in new projects. A low level of liquidity may be due to cash shortage or difficulties in quickly converting assets into cash. Liquidity, based on the current ratio, quick ratio, cash ratio, and cash operating cycle, quantifies the amount of short-term money available to satisfy daily commitments.

According to Victor Chiedu and Fodio (2012), businesses with high liquidity are more interested in disclosing their environmental performance than those with low liquidity. The claim is that organizations in safe and good financial standing will be interested in informing investors about their environmental issues. Similarly, Syukur, Novianti, and Karim (2021) find that liquidity benefits sustainable report disclosure. However, Nugroho and Arjowo (2014) note no discernible impact of liquidity on environmental reporting.

Based on the preceding review, our hypothesis is as follows:

1. Firm profitability has no significant effect on the EDI of listed energy firms in sub-Saharan Africa.
2. Firm size has no significant effect on the EDI of listed energy firms in sub-Saharan Africa.
3. Firm liquidity has no significant effect on the EDI of listed energy firms in sub-Saharan Africa.

2.6 Stakeholders Theory

Stakeholder theory, proposed by Freeman in 1984, asserts that organizations are responsible for considering the interests of all stakeholders, including shareholders, employees, customers, suppliers, and the broader community. It posits that a firm's success relies on effectively managing relationships with these stakeholders (Bassey, Effiok, & Eton, 2013). Business organizations inherently consist of stakeholders, and managing their interests, needs, and viewpoints is crucial for a corporation's long-term survival (Ikpor et al., 2022).

In a broader sense, the stakeholder view redefines the role and purpose of the organization beyond profit-making and shareholder wealth maximization. It emphasizes defending the image and values of

all interested parties and respecting the special relationships between the organization and its stakeholders (Kovács 2022).

Regarding environmental accounting, stakeholder theory emphasizes addressing environmental cost elements and values in a firm's financial statements. It advocates heightened environmental awareness, necessitating companies to extend their corporate planning to involve non-traditional stakeholders, such as regulatory adversarial groups, to respond to evolving social demands (Fabian & Emeka, 2022). The stakeholder theory proposes that stakeholders can exert pressure on organizations to disclose information about their environmental impact and performance.

The relevance of stakeholder theory is evident in our study, where we explore how corporations disclose information about their environmental performance, an area of interest for a wide range of stakeholders, including investors, policymakers, and the public. Understanding the influence of stakeholders can inform corporate decisions regarding environmental disclosures and promote greater accountability and transparency within the organization (or the energy sector) in Sub-Saharan Africa.

2.7 Empirical Review

Table 1. Empirical Review

Author(s)	Country	Title	Duration	Methodology	Key Findings
Agyemang, Yusheng, Twum, Edziah, and Ayamba (2023)	China	Environmental accounting and performance: Empirical evidence from China	2000 - 2020	Common Correlated Effects Mean Group	Conflicting conclusions between board characteristics and environmental accounting information disclosure (EAID). EADI and the environmental performance index have a positive slope relationship with the mining companies' profitability.
Orajekwe and Ogbodo (2023)	Nigeria	Firm Attributes and Environmental Disclosure of Energy Corporations in Nigeria	2013 - 2022	Multiple Linear Regression Approach	According to the results, the operational complexity and established reporting practices of larger and older enterprises made it difficult to provide extensive environmental information. However, there was no correlation between a company's use of leverage and its environmental disclosure practices.
Ezekwesili and Ezejiofor (2022)	Nigeria	Firm characteristics and	2011 - 2020	least square multiple regression analysis	The results showed that the cited conglomerate businesses in Nigeria's waste management expense were not

		environmental performance			considerably impacted by firm size and company leverage.
Ghosh, Pareek, and Sahu (2022)	India	The Role of Corporate Governance and Company Specific Characteristics on Environmental Disclosure Practices	2010 - 2021	GMM-based dynamic panel data regression analysis	Business age and the debt-equity ratio favorably affect environmental actions, whereas firm size adversely affects disclosure practices.
Maulana and Baroroh (2022)	Indonesia	The Effect of Industry Type, Company Size, Profitability, Leverage and Environmental Performance on Environmental Disclosure	2018 and 2020	multiple linear regression analysis	The research found that environmental disclosure environments were significantly influenced by characteristics such as industry type, firm size, profitability, and environmental performance. The leverage variable" has little to no effect on the sustainability report.
Ramaiah, Tiwari, Sayyad, and Mehta (2021)	India	Corporate Environmental Information Disclosure in India: Role of Board Characteristics	2017 - 2021	feasible generalized least square (FGLS) method	Although board independence and company size were shown not to affect environmental information disclosure, their research found that board size (BS), CEO duality (CO), board meetings (BM), Tobin Q & ROA all had significant effects.
Zulfikar (2021)	Indonesia, Malaysia	Comparative Study of Environmental Disclosure in Indonesia and Malaysia: Testing Company Characteristics	2017	multiple regression	Firm age, firm size, and audit firm size have all been shown to be important predictors of environmental disclosure in Indonesia and Malaysia's multiple regression analyses. However, there is no correlation between environmental disclosure

					and profitability or liquidity in any country.

Source: Author's Compilation (2023)

3. Research methodology

The research design employed in this study was an expo-facto research design chosen to investigate the connection between firm-specific attributes and environmental disclosure, using pre-existing data. The study focused on energy corporations listed on the stock exchanges of three sub-Saharan African countries, specifically Nigeria, Kenya, and South Africa, spanning the years 2014 to 2022 (nine years). The sample comprised sixteen (16) quoted firms primarily operating in the energy sector, selected from the stock exchanges of the countries mentioned above using a purposive sampling technique. Detailed information on the firms included in the sample is presented in Table 2. Secondary data from the annual reports of the selected listed energy firms in Nigeria, Kenya, and South Africa were used in this study. Moreover, the study utilized Multiple Regression Analysis (using STATA 14 software) to establish the causal relationship between firm-specific attributes and environmental disclosure.

Table 2. Sample Firm Description

S/N	Firm	Country
1	Ardova Plc	Nigeria
2	Conoil Plc	Nigeria
3	Efora Energy	South Africa
4	Eterna Plc	Nigeria
5	Exxaro Resources	South Africa
6	Geregu Power Plc	Nigeria
7	Industrial and Medical Gases Nigeria	Nigeria
8	Japaul Gold & Ventures	Nigeria
9	KenGen Limited	Kenya
10	Kenya Power & Lighting Company	Kenya
11	MRS OIL Nigeria Plc	Nigeria
12	Sasol	South Africa
13	Seplat Energy Plc	Nigeria
14	TotalEnergies Marketing Kenya	Kenya
15	TotalEnergies Marketing Nigeria Plc	Nigeria
16	Umeme Limited - Kenya	Kenya

Source: Author's Compilation (2023)

3.1 Model Specification

To conduct the analysis, we employed a regression technique using the following model:

$$\text{ESGit} = \beta 0 + \beta 1 C1it + \beta 2 C2it + \beta 3 C3it + \beta 4 C4it + \ldots \varepsilon t \quad (1)$$

Where:
ﻯðit = the dependent variable
€1it …€4it = the explanatory variables
β0 …β4 = the Beta coefficients
ɶt = the error term

Using the basic OLS model, specific models were formulated to test the proposed hypotheses as follows:

$$EDIit = \beta 0 + \beta 1FPRit + \beta 2FSZit + \beta 3FLQit + \beta 4FAGit + \beta 5FLVit + ɶt \quad (2)$$

The variables in Equation (2) are defined in detail in Table 3.

Table 3. Variables Definition and Details

Label	Variables	Variable Type	Measure
EDI	Environmental Disclosure Index	Dependent variable	"1" if waste management (GRI 306) is disclosed or "0" if not disclosed
FPR	Firm Profitability	Independent Variable	$Profit\ after\ tax / total\ Assets$
FSZ	Firm Size	Independent Variable	Natural log of total assets
FLQ	Firm Liquidity	Independent Variable	$Current\ Assets / Current\ Liabilities$
FAG	Firm Age	Control Variable	Duration of a firm's existence
FLV	Firm Leverage	Control Variable	$Total\ Liabilities / Total\ Assets$

Source: Author's Compilation (2023)

4. Result and Discussion

Descriptive analysis of the data was carried out using the mean, standard deviation, minimum value, and maximum value. The results of the descriptive analysis for Nigeria, South Africa, and Kenya are presented in Tables 4–6.

Table 4. Descriptive Statistics of Nine Quoted Energy Firms in Nigeria
Summarise FPR FSZ FLQ FAG FLV EDI

Variable	Obs	Mean	Std. Dev.	Min	Max
FPR	81	.0334819	.2295997	-.7135736	1.762669
FSZ	81	7.521414	.5816043	6.338312	8.319583
FLQ	81	1.255103	.5000529	.1898604	3.189255
FAG	81	36.53086	18.84747	5	65
FLV	81	.6517706	.3187589	.0488582	2.478466
EDI	81	.1111111	.3162278	0	1

Source: STATA 14 (2023)

Table 4 presents the descriptive statistics for the nine energy firms listed in the Nigerian exchange group. We obtained 81 observations for each variable. The mean values for Firm Profitability (FPR), size (FSZ), and liquidity (FLQ) are 0.033, 7.521, and 1.255, respectively. The results indicate that on average, the profitability, size, and liquidity of energy firms in Nigeria are relatively low to moderate. The average Firm Age (FAG) is 36.53 years, with a minimum of five years and a maximum of 65 years. This result implies that the energy firms in Nigeria have been in operation for a considerable period, showing stability and experience in the industry. The average Firm Leverage (FLV) is 0.652, indicating

that companies have moderate leverage, which may suggest that they are not heavily reliant on debt financing.

The Environmental Disclosure Index (EDI) has an average value of 0.111, with a minimum value of 0 and a maximum of 1. The results suggest that on average, the level of environmental disclosure by these energy firms is relatively low, indicating a need for improvement in disclosing their environmental performance.

Table 5. Descriptive Statistics of Three Quoted Energy Firms in South Africa
Summarise FPR FSZ FLQ FAG FLV EDI

Variable	Obs	Mean	Std. Dev.	Min	Max
FPR	27	-.444049	1.520996	-5.617228	.3135992
FSZ	27	5.260591	.9404721	4.316893	9.021826
FLQ	27	2.052503	2.312841	.2735612	11.10927
FAG	27	37	22.68005	14	72
FLV	27	.4703254	.2351531	.0390506	1
EDI	27	.6666667	.4803845	0	1

Source: STATA 14 (2023)

Table 5 presents the descriptive statistics for the three energy firms listed on the Johannesburg Stock Exchange (JSE). We obtained 27 observations for each variable. The mean values for Firm Profitability (FPR), Firm Size (FSZ), and Firm Liquidity (FLQ) were -0.444, 5.261, and 2.053, respectively. Unlike Nigeria, the energy firms in South Africa show negative profitability on average, indicating that they may be facing challenges in generating earnings from their operations. The average Firm Age (FAG) is 37 years, with a minimum of 14 years and a maximum of 72 years. This result suggests that energy firms in South Africa have been in operation for a considerable time, similar to Nigeria. The average Firm Leverage (FLV) is 0.470, indicating moderate leverage for these firms. The Environmental Disclosure Index (EDI) has an average value of 0.667, suggesting a relatively higher environmental disclosure level than in Nigeria. The results indicate that energy firms in South Africa may be more proactive in disclosing their environmental performance.

Table 6. Descriptive Statistics of Four Quoted Energy Firms in Kenya
Summarise FPR FSZ FLQ FAG FLV EDI

Variable	Obs	Mean	Std. Dev.	Min	Max
FPR	36	.0343718	.0228411	-.0028883	.0766864
FSZ	36	7.753895	.9145572	6.083481	8.700758
FLQ	36	1.149877	.5617028	.3628573	2.15512
FAG	36	59.25	29.83418	10	100
FLV	36	.6224877	.1656696	.2521698	.9103253
EDI	36	1	0	1	1

Source: STATA 14 (2023)

Table 6 presents the descriptive statistics of the four energy firms listed on the Kenyan stock exchange. We obtained 36 observations for each variable. The mean values for Firm Profitability (FPR), size (FSZ), and liquidity (FLQ) are 0.034, 7.754, and 1.150, respectively. These values are similar to those in Nigeria, indicating comparable profitability, size, and liquidity levels. The average Firm Age (FAG) is 59.25 years, with a minimum of 10 years and a maximum of 100 years. This result suggests that energy firms in Kenya have been operating for a longer period, possibly indicating a more established and experienced industry. The average Firm Leverage (FLV) is 0.622, similar to Nigeria and South Africa, indicating a moderate leverage. The Environmental Disclosure Index (EDI) has an average value of one, implying that energy firms in Kenya consistently disclose information about their environmental performance**.**

Table 7. Descriptive Statistics of Quoted Energy Firms in Sub-Saharan Africa
Summarise FPR FSZ FLQ FAG FLV EDI

Variable	Obs	Mean	Std. Dev.	Min	Max
FPR	144	-.0558326	.6966102	-5.617228	1.762669
FSZ	144	7.15563	1.182674	4.316893	9.021826
FLQ	144	1.378309	1.138972	.1898604	11.10927
FAG	144	42.29861	24.62902	5	100
FLV	144	.6104289	.2798674	.0390506	2.478466
EDI	144	.4375	.4978099	0	1

Source: STATA 14 (2023)

Table 7 presents the descriptive statistics of 16 energy firms from sub-Saharan Africa, combining data from Nigeria, South Africa, and Kenya. We obtained 144 observations for each variable. The mean values for Firm Profitability (FPR), Firm Size (FSZ), and Firm Liquidity (FLQ) were -0.056, 7.156, and 1.378, respectively. The negative mean value for Firm Profitability indicates that, on average, energy firms in sub-Saharan Africa may face challenges in generating earnings from their operations. However, the mean firm size and liquidity suggest that, on average, energy firms are of moderate size and have sufficient liquidity to meet their short-term obligations. The average Firm Age (FAG) is 42.299 years, indicating that the energy firms in sub-Saharan Africa have been in operation for a considerable period, showing stability and experience in the industry. The average Firm Leverage (FLV) was 0.610, indicating moderate leverage for these firms. The Environmental Disclosure Index (EDI) has an average value of 0.438, suggesting a moderate level of environmental disclosure among energy firms in Sub-Saharan Africa. These results indicate that there is room for improvement in disclosing the environmental performance of these companies.

4.1. Test of Hypotheses

Table 8 presents the results of the Pooled OLS Regression analysis.

Table 8. Regression Result
reg EDI FPR FSZ FLQ FAG FLV

EDI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
FPR	.155236	.0544877	2.85	0.005	.0474972	.2629748
FSZ	-.1975382	.0347559	-5.68	0.000	-.2662612	-.1288152
FLQ	-.041808	.0368919	-1.13	0.259	-.1147545	.0311384
FAG	.0069628	.0016141	4.31	0.000	.0037713	.0101543
FLV	-.1974065	.1520681	-1.30	0.196	-.4980912	.1032783
_cons	1.743287	.2552884	6.83	0.000	1.238504	2.248069

Source: STATA 14 (2023)

Test of Hypothesis I

$H0_1$: There is no significant effect of firm profitability on the EDI of listed energy firms in Sub-Saharan Africa

The coefficient for Firm Profitability (FPR) is 0.155236 with a standard error of 0.0544877. The t-value for FPR was 2.85, and the corresponding p-value was 0.005. Because the p-value (0.005) is less than the significance level of 0.05, we reject the null hypothesis. This result means that firm profitability significantly affects the Environmental Disclosure Index (EDI) of listed energy firms in Sub-Saharan Africa. Firms with higher profitability tend to have higher levels of environmental disclosure.

Test of Hypothesis II

$H0_2$: There is no significant effect of firm size on the EDI of listed energy firms in Sub-Saharan Africa

The coefficient for Firm Size (FSZ) is -0.1975382 with a standard error of 0.0347559. The t-value for FSZ was -5.68, and the corresponding p-value was 0.000. Because the p-value is less than the

significance level of 0.05, we reject the null hypothesis. This result means that firm size significantly affects the Environmental Disclosure Index (EDI) of listed energy firms in Sub-Saharan Africa. Specifically, larger firms tend to have lower levels of environmental disclosures.

Test of Hypothesis III

$H0_3$: There is no significant effect of firm liquidity on the EDI of listed energy firms in Sub-Saharan Africa

The coefficient for Firm Liquidity (FLQ) is -0.041808 with a standard error of 0.0368919. The t-value for the FLQ was -1.13, and the corresponding p-value was 0.259. Because the p-value (0.259) is greater than the significance level of 0.05, we fail to reject the null hypothesis. The results indicate that firm liquidity has no significant effect on the Environmental Disclosure Index (EDI) of listed energy firms in sub-Saharan Africa. In other words, firm liquidity does not significantly affect environmental disclosure practices.

4.2. Discussion

4.2.1 Firm Profitability

The finding of a significant positive effect of firm profitability on the Environmental Disclosure Index (EDI) suggests that more profitable energy firms in Sub-Saharan Africa are more likely to disclose information about their environmental performance. This finding could be attributed to several factors. First, profitable firms may have financial resources to invest in environmentally sustainable practices and initiatives, which they may want to highlight to stakeholders as part of their corporate social responsibility efforts. Second, positive environmental performance can enhance a firm's reputation and image, attracting more investors and customers in an increasingly environmentally conscious market. Abubakar et al. (2017) find that profits substantially positively affect environmental disclosure among listed brewery companies in Nigeria. Their study highlights the positive relationship between profitability and environmental reporting, which aligns with current findings.

4.2.2 Firm Size

The significant negative effect of firm size on EDI suggests that larger energy firms in Sub-Saharan Africa tend to have lower levels of environmental disclosure. There are several possible reasons for this finding. Larger firms often have more complex organizational structures, which may make decision-making processes slower and more bureaucratic. This can result in delays in the implementation and disclosure of environmental initiatives. Additionally, larger firms may operate in multiple countries with diverse environmental regulations and stakeholder demands, challenging to present a cohesive and standardized environmental disclosure. Research by Dibia and Onwuchekwa (2015) supports this stance, as they find that larger companies are less likely to disclose environmental risks. Gatimbu and Wabwire (2016) also find an inverse correlation between company size and environmental disclosure among publicly traded Dutch companies, further corroborating the current findings.

4.2.3 Firm Liquidity

The non-significant effect of firm liquidity on the EDI suggests that liquidity does not substantially impact environmental disclosure practices among listed energy firms in Sub-Saharan Africa. This finding could be because liquidity is primarily concerned with short-term financial health and does not directly influence a firm's long-term environmental sustainability strategy. Additionally, firms with high liquidity may prioritize other aspects of financial reporting over environmental disclosure, especially if they believe that environmental reporting does not significantly affect their financial performance. Nugroho and Arjowo (2014), who found no discernible impact of liquidity on environmental reporting, support this stance.

5. Conclusion

5.1. Conclusion

This study investigates the relationship between firm-specific characteristics and environmental disclosure among energy firms operating in Sub-Saharan Africa. The study's main objectives were to

assess the influence of firm profitability, size, and liquidity on the region's environmental disclosure index (EDI) of listed energy firms. This study's findings provide several important insights. First, firm profitability has a significant positive effect on the environmental disclosure index (EDI) of listed energy firms in Sub-Saharan Africa. This finding suggests that firms with higher profitability tend to be more transparent and proactive in disclosing information on their environmental performance and sustainability initiatives. Second, we find a significant negative effect of firm size on the environmental disclosure index (EDI). Larger energy firms in the region appear to have lower levels of environmental disclosure, indicating the potential challenges in communicating their environmental efforts and impacts to stakeholders. This finding highlights the need for larger companies to improve their environmental reporting practices and to demonstrate greater accountability in environmental matters. Interestingly, the study did not find a significant effect of firm liquidity on the environmental disclosure index (EDI). This finding suggests that energy firms' liquidity position may not be a significant determinant of their environmental disclosure practices. However, this does not negate the importance of liquidity in supporting sustainable practices and investments for environmental protection.

5.2. Limitation

Despite the valuable insights gained from this study, some limitations should be acknowledged. First, the study focused on energy firms listed in only three countries in sub-Saharan Africa: Nigeria, South Africa, and Kenya. Thus, the findings may need to be more generalizable to other countries in the region, which may have different regulatory frameworks, business practices, and environmental reporting standards. Second, this study used waste management (GRI 306) as a proxy for environmental disclosure, which may not capture the full extent of environmental reporting practices among energy firms. Future research could consider using more comprehensive measures of environmental disclosure to provide a more nuanced understanding of this subject. Moreover, the study's reliance on secondary data from annual reports may also pose limitations, as the accuracy and completeness of disclosed information could vary among companies. In addition, this study focuses on firm-specific characteristics. It did not explore other factors influencing environmental disclosure, such as regulatory pressures, stakeholder demands, or industry- or country-specific factors.

5.3. Suggestion

Based on the findings and limitations of this study, several suggestions are proposed to enhance environmental disclosure practices among energy firms in sub-Saharan Africa:

1. Diversification of Research Scope: Future research should consider expanding the scope of the study to include a broader range of countries in sub-Saharan Africa, encompassing more diverse regulatory environments and cultural contexts. This could provide a more comprehensive understanding of the factors influencing environmental disclosure across the region.
2. Enhanced Environmental Reporting Standards: Energy firms should adopt internationally recognized environmental reporting standards such as the Global Reporting Initiative (GRI) framework. Standardized reporting practices can improve comparability, transparency, and accountability, enabling stakeholders to make informed decisions.
3. Capacity Building and Awareness: Larger energy firms should invest in capacity building and training their sustainability and reporting teams to improve their expertise in environmental reporting. Furthermore, all energy firms need to raise awareness of the importance of environmental disclosure for stakeholder engagement and sustainable development.
4. Stakeholder Engagement: Energy firms should actively engage with stakeholders, including investors, local communities, and environmental organizations, to understand their concerns and expectations regarding environmental disclosure. Engaging in constructive dialogue can lead to the identification of relevant environmental indicators and foster a culture of transparency and responsibility.
5. Integration of Sustainability Goals: Energy firms should integrate environmental sustainability goals into their corporate strategy. By aligning business objectives with environmental performance targets, firms can drive meaningful changes and demonstrate commitment to sustainable practices.

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