

The Determinants of Corporate Social and Environmental Disclosure in the Nigerian Oil and Gas Industry: An Empirical Investigation

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ABSTRACT

This paper investigates whether corporate size, profitability, leverage, management efficiency, liquidity and tax can explain the level and quality of social and environmental disclosure (SED) in the Nigerian oil and gas industry. Time-series cross-section (TS-CS) data for a sample of eight listed Nigerian oil and gas companies are collected for the period 2004–2013. We use word count and compliance-oriented content analysis to measure the quantity and quality of SED respectively. We use pooled ordinary least squares (OLS) with panel corrected standard errors to examine the relationship between SED quantity and quality, on the one hand, and the six regressors, on the other hand. Results documented show that listed companies in the Nigerian oil and gas industry make low disclosures on few Global Reporting Initiative (GRI) items which exhibit low quality. While the low nature of the disclosure quantity is explained by size and to some extent management efficiency, the poor disclosure quality is jointly and individually explained by corporate size, management efficiency and liquidity. The paper provides empirical evidence showing that listed Nigerian oil and gas companies are exploiting the vulnerabilities of Nigeria as a resource-rich less-developed country. Furthermore, our findings imply that legitimacy theory is useful in explaining SEDs in Nigeria through the extent of management efficiency and liquidity.

INTRODUCTION

Over time, awareness about the impacts of businesses on the society, environment as well as socio-regulatory pressure has resulted in demand

for businesses to give accounts of these impacts to their stakeholders (Phoprachak & Buntornwon, 2020). It is argued that modern corporate business environment is surrounded by strong public scrutiny from diverse stakeholder groups who are calling on businesses to accept accountability for not only their economic actions, but also the social and environmental implications of their activities (Cheng *et al.*, 2016). Many corporate businesses are today not only paying attention to the social and environmental needs of their stakeholders, but are also communicating same by providing Corporate Social and Environmental Disclosures (SED) (Deegan *et al.*, 2000; Yusoff *et al.*, 2019). However, corporate SEDs are predominantly practiced by corporations in developed countries (Tsang, 1998; Dobers & Halme, 2009; Barakatm *et al.*, 2019). Similarly, studies on SEDs are evidently more prevalent in developed countries (Juhmani, 2014; Yusoff *et al.*, 2019; Wasiuzzaman, 2019). These disclosure practices and studies thereon are at infancy stage (Tsang, 1998) or just started evolving (Belal *et al.*, 2013) in developing countries like Nigeria. Consequently, the literature is hungry for more studies on SEDs in developing countries (Belal *et al.*, 2013; Istiqomah & Wahyuningrum, 2020).

Furthermore, logically, studies on SED seem more essential in developing countries where there are lots of social and environmental impacts resulting from corporate organizations' unchecked activities (Maunder *et al.*, 1990; Gray and Kouhy, 1993; Hanafi, 2006; Asrori *et al.*, 2019, Hassan & Kouhy, 2019). In essence, findings and recommendations from these studies may be useful to corporate organizations and policy makers such that these corporate organizations could embrace the practice (Prakash & Rappaport, 1977; Hanafi, 2006). Embracing the practice may lead to provision of informative accountability (Hassan, 2012; Asrori *et al.*, 2019) which has the ability to induce changes in corporate behavior (Prakash & Rappaport, 1977). Indeed, this information inductance effect could serve as a solution or at least a means to reducing the social and environmental impacts of corporate organizations in developing countries (Hanafi, 2006; Phoprachak & Buntornwon, 2020).

Nigeria, and the Niger Delta oil and gas producing region in particular, are facing lots of social and environmental problems. These problems are largely created by international oil companies (IOCs) who are the major operators in the Nigerian oil and gas industry (NNPC, 2014). IOCs in Nigeria are mainly operating through unincorporated joint venture arrangements with the Nigerian National Petroleum Corporation (NNPC) (Hassan, 2012). Operating through unincorporated joint venture means that IOCs in Nigeria are not legally bound to make disclosures on their operations in the country including disclosures on social and environmental

impacts. However, Nigerian listed oil and gas companies are becoming significant players in the industry through takeovers of stakes relinquished by IOCs (Obasi, 2013; Shosanya, 2013). Listed Nigerian oil and gas companies are required by law to provide disclosures in accordance with the country's legal and standard requirements. Thus, their adoption of SEDs could serve as informative accountability to stakeholders. This may in turn serve as a means to ameliorating the numerous social and environmental impacts on the host communities in the Niger Delta (Hanafi, 2006; Belal *et al.*, 2013).

The aim of this study is to examine the determinants of SED level and quality by listed Nigerian oil and gas companies longitudinally for 10 years (2004 – 2013). While modified word count content analysis is used to measure the volume of SED, scoring disclosure compliance with Global Reporting Initiative (GRI) guidelines on each sustainability performance indicator is applied to measure the quality (Hassan, 2019). Using time-series cross-sectional (TS-CS) regression analysis, the study investigates the effect of size, profitability, leverage, efficiency ratio, tax and liquidity on the quantity and quality of SEDs. The study brings to light the contribution of listed Nigerian oil and gas companies to informative accountability. Similarly, the study is useful to managers of the oil and gas companies, policymakers in the Nigerian petroleum industry and the Nigerian government in general. The study also fills the gap calling for more empirical research on SEDs in developing countries (Belal *et al.*, 2013). In this way, the study adds value to existing knowledge on SED in the Nigerian oil and gas industry. The rest of the paper is structured such that section 2 presents the literature review. Section 3 focuses on material and methods. Results of the study are presented and discussed in section 4 and section 5 concludes the study.

1. LITERATURE REVIEW

1.1. Social and environmental impacts of oil and gas activities in the Nigerian oil and gas producing region

Onshore and offshore exploration and production activities in the Niger Delta region are associated with lots of social and environmental impacts. Some of these impacts are peculiar to the region while others such as gas flaring with its associated carbon emissions are problems for the country in particular and the world in general (Hassan, 2012; Hassan & Kouhy, 2013, 2014). Converting scarce farming and fishing lands to oil and gas fields and wells reduces food and cash crops production (Jike, 2004; Allen, 2012). With less or no farming lands, feeding and educating households

have become serious social problems to contend with (Okereke & Orjiafor, 2011). Similarly, child mortality, maternal morbidity, malaria and typhoid fever are on the increase in the region as households cannot afford treatments due to abject poverty sequel to the destruction of their means of livelihood by oil and gas exploration activities (Okereke & Orjiafor, 2011). Poverty is also documented as a reason for massive rural–urban youth migration leading to overpopulation in cities, increase in crime rates and pressure on scarce social amenities in the urban areas (Mabogunje, 1968).

A major environmental impact of the Nigerian oil and gas industry is gas flaring. Nigeria led the top 20 global flaring countries in 2004 (World Bank, 2004; Gervet, 2007), then fell to the second position following Russia in subsequent years (World Bank, 2015). Long term gas flaring is found responsible for bronchial and respiratory diseases among people in the region (Akoroda, 2000; Ebegbulem *et al.*, 2013). Findings also indicate that residents in and around oil-rich zones are predisposed to respiratory problems, skin disorders, health risks and child deformities (Ana *et al.*, 2009). Oil spillage is another major environmental impact of the oil and gas industry in Nigeria. However, oil and gas exploration and production in Nigeria are majorly undertaken by IOCs which report little or no information on these social and environmental impacts. The reporting could have portrayed them as rendering informative accountability (Hassan, 2012) which has the ability to induce changes in corporate behavior (Prakash & Rappaport, 1977; Hamil, 1999; Belal *et al.*, 2013). This informative accountability may, through inductance effect, serve as a solution for, or at least a means to, reducing the social and environmental impacts of the IOCs through dialoguing with stakeholders (Prakash & Rappaport, 1977; Hamil, 1999; Hanafi, 2006; Post, 2013; Colaço & Simão, 2018).

However, listed Nigerian oil and gas companies are becoming important players in the industry (Obasi, 2013; Shosanya, 2013). They are required to render annual disclosures of their activities to relevant government agencies, shareholders and the public. Thus, companies in the Nigerian oil and gas industry may be using SEDs as informative accountability to stakeholders. This may in turn serve as a means expected to lead to addressing the numerous social and environmental impacts affecting the host community (Hanafi, 2006; Belal *et al.*, 2013). Therefore, this study aims to investigate the determinants of SED level and quality by listed Nigerian oil and gas companies covering the period, 2004–2013. In doing this, the study estimates and analyze the effects of corporate size, profitability, leverage, efficiency ratio, liquidity and tax on the SEDs by listed Nigerian oil and gas companies. The next section reviews literature on the effect of these corporate characteristics on SED studies.

1.2. Corporate characteristics and social disclosures

1.2.1. Corporate size

Three major approaches are employed to measure the size of a company. Some studies use sales volume to measure size (see, David *et al.*, 1996; Galani *et al.*, 2011; Alkababji, 2014). Others quantify corporate size through total asset value (see, Hossain & Reaz, 2007; Juhmani, 2014). Yet, there are some studies that use number of employees measure the variable (Hackston & Milne, 1996; Tagesson *et al.*, 2009).

Size is an important firm characteristic that determines the level of SED by companies. On this note, it is argued that large firms are more geographically spread and therefore have larger market for products which may translate into having more diversified stakeholder groups requiring firms to disclose more information than small firms (Brammer & Pavelin, 2008). Also, Bani-Khalid *et al.* (2017) contend that firms that are more visible and exposed to public scrutiny are likely to make more disclosures. Although some studies document absence of a significant relationship between size and SED (see, for example, Eljido-ten, 2004; Osazuwa *et al.*, 2013; Hassan & Kouhy, 2015), most studies establish a significant positive relationship between the two variables (see, McKinnon and Dalimunthe, 1993; Evangelinos, & Kourmousis, 2009; Skouloudis *et al.*, 2013; Bhattacharyya, 2014; van de Burgwal & Vieira, 2014; Giannarakis, 2015; Schreck & Raithel, 2015; Bani-Khalid *et al.*, 2017). Thus, we null-hypothesize that:

- H1:** *There is no significant relationship between corporate size and the quantity of corporate SED by listed companies in the Nigerian oil and gas industry.*
- H2:** *There is no significant relationship between corporate size and the quality of corporate SED by listed companies in the Nigerian oil and gas industry.*

1.2.2. Profitability

Most studies in the literature of social and environmental accounting use return on asset (Hackston & Milne, 1996; Bala *et al.*, 2019); net profit (Gray & Bebbington, 2001; Echave & Bhati, 2010; Nandi & Ghosh, 2012) and return on equity (Belkaoui & Karpik, 1989; Tagesson *et al.*, 2009; Menassa, 2010; Odera *et al.*, 2016; Andriana & Anisykurlillah, 2019) to measure profitability.

The ability of management to make a corporation profitable is, at least in part, an indication of the knowledge and understanding of social and environmental issues. Consequently, it is argued that profitable firms make more disclosure on social and environmental impacts (Belkaoui & Karpik, 1989). In this light, higher profits provide more slack resources for firms to

utilize in discharging CSR and providing information thereon (Krishnan *et al.*, 2019). Consequently, it is argued that profitable corporations have the economic resources to make more SEDs (Cowen, *et al.*, 1987; Hackston & Milne, 1996; Pirsch *et al.*, 2007). Corporate profitability is regarded as a source of exposure to political pressure and public scrutiny and SEDs are used to reduce negative impacts of the pressure and scrutiny (Ng & Koh, 1994; Tagesson *et al.*, 2009).

Strong positive association has been variously reported between profitability and the extent of SED (Jenkins & Yakovleva, 2006; Tagesson *et al.*, 2009; Menassa, 2010). On the contrary, no significant association is found between profitability and SED levels (Echave & Bhati, 2010; Monteiro & Aibar-Guzmán, 2010; Suttipun & Stanton, 2012). This study aims to contribute to the inconclusive debate by testing the following null hypothesis in the context of Nigeria.

H3: *There is no significant relationship between profitability and the quantity of SED by listed companies in the Nigerian oil and gas industry.*

H4: *There is no significant relationship between profitability and the quality of SED by listed companies in the Nigerian oil and gas industry.*

1.2.3. Corporate leverage

Leverage is seen as the degree of using borrowed funds to increase potential gains or reduce losses of corporate organizations beyond or below those which could have been made if the organization had used its own funds (D'Hulster, 2009). Therefore, a high leveraged firm uses more of debts in financing its operations than its own funds, while low leveraged firm employs less of borrowed funds in its operations (Glancy, 2015). Relating leverage to disclosures, it is argued that in leveraged companies, corporate managers are likely to increase disclosures in order to reduce agency costs between insiders and creditors. Therefore, to satisfy creditors interested in SEDs, leveraged companies are likely to make more SEDs (Alsaeed, 2006; Aly *et al.*, 2010; Zhang, 2013).

A Significant relationship is reported between leverage and corporate SED by many studies in the literature (see, for example, Branco & Rodrigues, 2008; Aly *et al.*, 2010; Juhmani, 2014; Sulaiman *et al.*, 2014). However, Akrou and Othman, (2013) as well as Echave and Bhati (2010) find no statistically significant relationship between leverage and corporate SED. Since there are mixed results on the effect of this corporate attribute on corporate SED, we contribute to the debate by testing the following null hypotheses:

H5: *There is no significant relationship between leverage and the quantity of SED by listed companies in the Nigerian oil and gas industry.*

H6: *There is no significant relationship between leverage and the quality of SED by listed companies in the Nigerian oil and gas industry.*

1.2.4. Management efficiency

From the business perspective, efficiency measures the ability of management to generate enough revenue relative to the amount of money invested in the business (Lindsay, 2014). This type of efficiency can be measured through various accounting ratios and it is from this perspective that our study explores its effect on corporate SED. Total assets turnover (TAT) ratio which measures management's efficiency in utilizing both short-term and long-term assets to generate sales is used in this study. High asset turnover is most desirable when measuring efficiency using this ratio (Lindsay, 2014). It is argued that corporate SEDs are additional corporate responsibilities to its main role of making profits (Friedman, 1970). However, corporate SEDs are associated with increased sales, increased market share, decreased operating costs and lower labour costs (Azapagic, 2003; Kotler & Lee, 2005). Therefore, if management can utilize available assets employed and human resources to generate acceptable revenues, then it should utilize a portion of the same resources to make more SEDs in order to reap the above benefits. Consequently, we null-hypothesize that:

H7: *There is no significant relationship between management efficiency and the quantity of SED by listed companies in the Nigerian oil and gas industry.*

H8: *There is no significant relationship between management efficiency and the quality of SED by listed companies in the Nigerian oil and gas industry.*

1.2.5. Liquidity

Corporate liquidity demonstrates corporation's ability to meet its current obligations with short term assets (Poznanski *et al.*, 2013). On this note, Abd-Elsalam, (1999) contends that corporate organizations with high liquidity ratio make more disclosures than companies with low liquidity based on signalling theory. Consistent with agency theory, it is, however, argued that companies with low liquidity disclose more corporate information to satisfy the needs of shareholders and creditors (Aly *et al.*, 2010). These arguments are extended to corporate SED practices. For example, a positive relationship between corporate liquidity and SEDs by Indian companies is documented (Nandi & Ghosh, 2012). Similarly, Coebergh (2011) reports a significant positive relationship between liquidity and corporate SED by companies in the Netherlands. Also, a study by

Samaha and Dahawy (2011) reports a significant positive association between liquidity and corporate SED by Egyptian companies. Conversely, Hussainey *et al.*, (2011) establish no relationship between corporate liquidity and SED in Egypt. Similarly, Aly *et al.* (2010) find no relationship between corporate liquidity and SED by Egyptian companies. Thus far, there are mixed results in the literature on the effect of corporate liquidity on SED. Therefore, we employ this variable to investigate its effects on the quantity and quality of SED by listed Nigerian oil and gas companies through the following null hypotheses.

H9: *There is no significant relationship between liquidity and the quantity of SED by listed companies in the Nigerian oil and gas industry.*

H10: *There is no significant relationship between liquidity and the quality of SED by listed companies in the Nigerian oil and gas industry.*

1.2.6. Tax

Payments of taxes by corporate organizations are seen as means of meeting corporate civic obligations and responsible behavior which ensure a harmonious relationship with the government and the general public (Lanis & Richardson, 2013). Although payment of taxes could be seen as good corporate behavior, corporate organizations are often reluctant to pay taxes for they are considered as additional burdens which erode profits (Baker, 2007; Price water house Coopers, 2013). Indeed, corporations do follow legal means to avoid taxes, and sometimes follow illegal ways to evade them by establishing aggressive tax schemes (Lanis & Richardson, 2013). Nonetheless, it could be argued that if corporate organizations pay taxes, they are likely to provide elaborate explanations on such payments in an effort to portray themselves as good citizens. Similarly, they are likely to make reference to such payments while making SED. From this perspective, organizations make more SEDs in those years they pay more taxes than in the years in which they pay less. Therefore, this study investigates the effect of tax on the quantity and quality of SEDs by listed Nigerian oil and gas companies by testing the following null hypotheses.

H11: *There is no significant relationship between corporate tax and the quantity of SEDs by companies and in the Nigerian oil gas industry.*

H12: *There is no significant relationship between corporate tax and the quality of SEDs by companies in the Nigerian oil gas industry.*

1.3. Legitimacy theory and ‘vulnerability and exploitability framework’

We combine the lenses of legitimacy theory and the ‘vulnerability and exploitability framework’ to underpin our study.

Legitimacy is defined as a supposition that the actions of an entity are appropriate within the socially constructed system of norms, values, beliefs, and definitions as perceived societies (Suchman, 1995). A particular feature of legitimacy theory is the assumption of a social contract between an organization and the society (Campbell, 2003; Branco & Rodrigues, 2006; Magness, 2006; Deegan, 2007). Thus, it is assumed, within the context of legitimacy theory, that the society allows an organization to continue its operations to the extent that it generally meets the expectations of the society (Deegan, 2007). Where the organization is perceived as failing in its social contract, a legitimacy gap is said to arise (Branco & Rodrigues, 2006) and the society can impose sanctions on it in the form of restricting its operations, limiting its access to resources (financial, labor etc.) and/or reducing the demand for its products through boycotts (Deegan, 2007).

However, it is argued that societal expectations and perceptions of corporate organizations are not fixed but dynamic and therefore change over time (Cormier & Gordon, 2001; Deegan & Blomquist, 2006). These changes in societal expectations and perceptions also create legitimacy gap which could be narrowed by providing more SEDs as suggested by legitimacy theory (Campbell *et al.*, 2003). Thus, Lindblom (2010) suggests that changing the perception of the relevant public should be managed through SEDs. In this regard, the disclosures are provided to educate the “relevant public” about changes in activities or performance; change the perception of the relevant public; contrive the perception of the relevant public and or change the public’s perceptions about the firm performance (Hassan & Kouhy, 2014a).

Vulnerability is described as exposure to the possibility of being attacked or harmed, either physically or emotionally while exploitability denotes tendency to being exploited selfishly or unethically by someone (Montalbano, 2011; Belal *et al.*, 2013; Hassan & Kouhy, 2014b). The International Monetary Fund (IMF) country classification 2015 divided the world into two major groups as advanced economies and emerging and developing economies. Emerging and less developed countries are associated with poverty, lower income per capita, less industrialization, low literacy, and high population growth. Conversely, some emerging and less developed countries are endowed with natural resources such as mineral oil, gas, forests and a large human population living in poverty (Belal *et al.*, 2013). Alongside these resources, there exist weak legal and regulatory frameworks (Belal *et al.*, 2013; Hassan & Kouhy, 2014a). Indeed, it is argued that government’s drive to legislate and regulate is missing in many developing countries (Hilson, 2012).

Therefore, governments in such countries end up providing concessions and assurances concerning future legislations and regulations (referred to as stabilization clauses) to Multinational Corporations (MNC's) and indigenous companies with financial and technical capacities to harness the resources (Sikka, 2011). Indeed, due to governments' heavy dependence on revenues from oil and gas resources, they most often agree to stabilization policies harmful to future taxes and social and environmental stability (Sikka, 2011; Belal *et al.*, 2013). Similarly, the clauses may restrict raising wages for employees in the future (Sikka, 2011; Belal *et al.*, 2013). It could be argued that corporations seek for such stabilization clauses to ensure maximization of profits as the main motive of corporations. Related to this is the fact that citizens of these countries who provide labor services are faced with low wage (Powell & Zwolinski, 2012; Belal *et al.*, 2013). However, they have to endure the low wage as it cannot be raised to a point where their standards of living are improved due to clauses restricting so (Belal *et al.*, 2013). Therefore, the combination of low per capita income, available resources and weak legal structures make emerging and less developed countries vulnerable and exploitable (Belal *et al.*, 2013). This study combines legitimacy theory and vulnerability and exploitability framework in analyzing SED by sample Nigerian oil and gas companies as explained in the ensuing paragraph.

Vulnerability and exploitability analytical framework expounds corporate exploitation of vulnerable governments and citizens in developing countries like Nigeria by not rendering accountability for their social and environmental impacts. The combination of low per capita income, weak legal structures and available oil and gas resources in Nigeria are features of vulnerability and exploitability. The government needs revenues from oil and gas resources resulting in giving concessions at the detriment of social and environmental stability. Most Nigerian citizens are battling with low poverty and low literacy (World Bank, 2015). Thus, while the government is more concerned with revenues from oil and gas companies, citizens providing labor services are more concerned about the low wages coming from the corporations. Therefore, corporate social and environmental impacts do not attract the attention of both the Nigerian government and its citizens. Consequently, the listed oil and gas companies may be exploiting these and other vulnerabilities by not taking responsibility for and disclosing their social and environmental impacts. However, legitimacy theory posits that corporate organizations draw legitimacy from the wider society, although some groups are considered as the legitimacy conferring stakeholders. Therefore, corporate organizations identify relevant stakeholders and how each influences the

flow of resources to them in order to manage and maintain legitimacy. SEDs are tools employed by corporations for continued legitimacy. Despite the apparent weakness of governments and citizens in Nigeria, oil and gas companies may be paying attention to some of their few legitimacy conferring stakeholders by making disclosures on issues of interest to them. In such circumstances, the disclosures may be low and on few items which do not, perhaps, reflect factual social and environmental impacts in the industry.

2. DATA AND METHODS

2.1. Sample

There are fourteen (14) listed oil and gas companies on the Nigerian Stock Exchange (NSE) website. However, out of the 14, two companies were only listed in 2009 and 2014. As such, we took them out of the sample as they did not have financial statement for most years. During the collection of hard copies of annual reports and accounts of the companies, it was discovered that two companies were delisted. Furthermore, two other companies were operating intermittently, and for this reason, their annual reports and accounts were not available for most years within the relevant period. Therefore, out of a total of fourteen (14) companies, only eight (8) companies' full annual reports and accounts were available for the period, 2004-2013.

2.2. Measurement of the dependent variables

We use a modified word count to measure the level of SED and compliance-oriented content analysis to measure the quality.

2.2.1. SED Quantity

Having collected the annual reports and accounts of the eight companies for ten years (2004–2013), we use modified word-count to determine the quantity of disclosure for each company in our sample. Content analysis is defined as a method in which qualitative data are systematically converted to quantitative form to aid analysis (Collis & Hussey, 2014). The method assumes that the extent of information disclosed signifies the importance of a particular topic, say carbon emission, to a reporting entity (Krippendorff, 1980). Various units of measurement are employed in SED studies. Word count (Zeghal & Ahmed, 1990; Deegan & Gordon, 1996); sentence counts (Hackston & Milne, 1996); average lines (Belal & Lubinin, 2009) and proportion of pages (Gray *et al.*, 1995) are used and a researcher

is free to choose the method considered most appropriate (Williams, 1999). This study adopts modified word-count content analysis in which the number of words in phrases, sentences, paragraphs or pages conveying social or environmental message are counted.

2.2.2. SED Quality

In conducting content analysis in SED studies, disclosure index which identifies and quantifies compliance to GRI guidelines is used (see, Clarkson *et al.*, 2008). Consequently, this study adopts the GRI, whose guidelines are described as the most widely used SED guideline (Roca & Searcy, 2012; Alonso-Almeida *et al.*, 2014; Lu & Abeysekera, 2014; van de Burgwal & Vieira, 2014), to develop our compliance-oriented disclosure index to measure quality. Disclosure compliance to GRI on each performance indicator is scored to obtain quality scores for each company over the ten years (2004-2013). Therefore, a scale of 0 – 3 is adopted such that if there is no disclosure on a performance indicator 0 is scored. However, if there is disclosure without any semblance to GRI guidelines, 1 is scored. If disclosure is partially consistent with GRI guideline, 2 is scored while if a disclosure is fully consistent with GRI guideline, 3 is scored.

Independent variables

The data for this study are obtained from eight (8) companies over ten years. Therefore, the dataset is time-series cross-sectional (TS-CS). Although the number of observations is relatively small, appropriate regression model is applied for estimation. The study examines the effects of corporate internal characteristics such as size, profitability, leverage, efficiency, liquidity and tax on the quantity and quality of SED by sample companies. Measurement strategies for the independent variables of this study are shown in Table 1.

Table 1
Independent variables and their measurements

<i>Regressor</i>	<i>Notation</i>	<i>Measurement</i>
Corporate size	<i>LOG_SIZE</i>	Measured by the natural logarithm of total turnover.
Corporate profitability	<i>PROF</i>	Measured by earnings per share.
Corporate leverage	<i>LEV</i>	Measured by debt to equity ratio.
Corporate efficiency	<i>E-RATIO</i>	Measured by the asset to turnover ratio.
Corporate liquidity	<i>LIQ</i>	Measured by liquidity ratio
Corporate tax	<i>LOG_TAX</i>	Measured by the natural logarithm of corporation tax for the year.

2.3. Regression model

Tim-series cross-sectiona (TS-CS) dataset is characterized by repeated observations (most often years) on fixed units such as states or nations (Beck, 2001), but could also be on particular household or firms (Wooldridge, 2011). This kind of data produces arrays of information which combines data on N spatial unit and T time period to produce NxT observations. This type of data poses some challenges to researchers when estimating suitable models for analysis. First, there is the tendency of panel residuals to be serially correlated (Beck & Katz, 1995; 2011). Second, there might be contemporaneous correlation, also known as cross-sectional dependence (Beck & Katz, 2011). Third, there might be panel heteroscedasticity. Fourth, errors may contain both cross-sectional and temporal effects, thus concealing unit and period effects (Beck, 2001; Das, 2019).

To overcome these problems when modelling TS-CS dataset using OLS, Parks (1967) develops the Feasible Generalized Least Square (FGLS). However, his approach is accused of producing standard errors which inflate test statistics and p-values leading to rejections of null hypotheses that should not be rejected. Consequently, Beck and Katz, (1995) develop a method which retains the OLS parameters but replaces its standard errors with what they termed as Panel Corrected Standard Errors (PCSE). They argue that in the case of homoscedasticity and contemporaneous independent errors, PCSE performs as well as OLS where OLS errors are accurate (Beck & Katz, 2004). When the performance of OLS declines due to less spherical errors, PCSE still performs well, concluding that PCSE should replace OLS standard errors for TS-CS data (Beck & Katz, 2004). PSCE method of estimating a model for TS-CS dataset is increasingly being used (Barako, Hancock, & Izan, 2006; Hassan, 2012; Hassan & Kouhy, 2014; Bala *et al.*, 2020). This study also employs the PCSE method in estimating suitable models to test its hypotheses.

Thus, to investigate the determinants of SED quantity, we specify the following TS-CS model:

$$\begin{aligned} LOG_QNT_{it} = & \alpha_0 + \alpha_1 LOG_SIZE_{it} + \alpha_2 PROF_{it} + \alpha_3 LEV_{it} + \alpha_4 ERATIO_{it} \\ & + \alpha_5 LIQ_{it} + \alpha_{it} LOG_TAX_{it} + \vartheta 1_{it} \end{aligned} \quad (1)$$

However, to evaluate the determinants of SED quality, we specify the following model:

$$\begin{aligned} LOG_QNT_{it} = & \beta_0 + \beta_1 LOG_SIZE_{it} + \beta_2 PROF_{it} + \beta_3 LEV_{it} + \beta_4 ERATIO_{it} \\ & + \beta_5 LIQ_{it} + \beta_{it} LOG_TAX_{it} + \vartheta 2_{it} \end{aligned} \quad (2)$$

Where:

QNT	Quantity of social and environmental disclosure
QLT	Quantity of social and environmental disclosure
α_0	The intercept of the QNT model
$\alpha_1 - \alpha_6$	Slopes of the independent variables in the QNT model
β_0	The intercept of the QLT model
$\beta_1 - \beta_6$	Slopes of the independent variables in the QNT model
SIZE	Corporate size
PROF	Corporate profitability
LEV	Corporate leverage
E-RATIO	Corporate efficiency
LIQ	Corporate liquidity
TAX	Corporate tax
ϑ_{1it}	The error term of the QNT model
ϑ_{2it}	The error term of the QLT model

3. RESULTS AND DISCUSSION

3.1. Multivariate regression results: The determinants of SEDs

In this section, we, first, describe the nature of our TS-CS dataset by presenting summary statistics for each variable and pair-wise correlation coefficients in Table 2 and Table 3 respectively. Secondly, we present the results of our regression analysis estimated to examine the relationship between the quantity and quality of SED and the six potential determinants.

Table 2
Summary statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
LOG_QNT	6.3296	0.8550	3.1400	8.0000
LOG_QLT	0.1262	0.0462	0.0000	0.2500
LOG_SIZE	24.6875	1.7392	17.7489	27.3505
EPS	390	563	-1996	1601
LEV	0.7491	0.2688	0.0847	1.6729
E-RATIO	2.8466	2.1217	0.1101	10.3532
LIQ	5.6613	18.6537	0.2524	132.0470
LOG_TAX	20.0440	1.9196	12.5941	23.1640

Table 3
Correlation matrix

Variables	LOG_ QNT	LOG_ QLT	LOG_ SIZE	EPS	LEV	E- RATIO	LIQ	LOG_ TAX
LOG_QNT	1							
LOG_QLT	-	1						
LOG_SIZE	0.4944	0.3703	1					
EPS	0.0967	0.0771	0.3707	1				
LEV	0.1196	0.1371	0.1918	0.2148	1			
E-RATIO	-0.0324	-0.0847	0.382	0.5178	0.4189	1		
LIQ	0.0255	0.058	0.0607	-0.0063	-0.2605	-0.0685	1	
LOG_TAX	0.4261	0.3017	0.7692	0.4523	0.2576	0.3496	-0.0306	1

Table 4 presents the results of an exploratory fixed effects (FE) model which is subjected to various diagnostic tests. Firstly, the FE models for QNT and QLT are not well fitted as the R-squared in each case is low. The F-statistic for the QNT model is significant at 10% while that of the QLT is insignificant. Further investigation shows that the QNT model suffers from cross-sectional dependence and panel heteroskedasticity but the QLT model only suffers from cross-sectional dependence. As expected, both models are free from time-specific fixed effects and panel serial correlation. Since

Table 4
Exploratory fixed effects model and diagnostic tests

Dependent variable Independent variables	LOG_QNT		LOG_QLT	
	Coef.	Std. Err.	Coef.	Std. Err.
LOG_SIZE	0.2199**	0.09789	0.00546	0.00538
EPS	0.00017	0.00021	0.00001	0.00001
LEV	0.35592	0.42203	0.01918	0.02321
E-RATIO	0.01706	0.08067	0.00015	0.00444
LIQ	-0.00184	0.00460	-0.00001	0.00025
LOG_TAX	0.04259	0.06768	-0.00192	0.00372
CONSTANT	-0.32462	2.28231	0.01221	0.12553
Goodness of fit and diagnostic tests				
R-squared		19.74		8.81%
F-statistic		1.93*		0.34
Time fixed effects: F-statistic		1.61		1.49
Panel serial correlation		0.311		2.084
Breusch-Pagan LM test for cross-sectional dependence		43.59***		31.187
Panel heteroskedasticity		721.51***		277.87***

***significant @ 1%, **significant @ 5%, *significant @ 10%,

FGLS does not perform well with a small sample (Beck & Katz, 1995), we use PCSE to estimate both the QNT and the QLT models, and we present the results in Table 5.

The information presented in Table 5 under the QNT model reveals that out of the six variables tested as potential determinants of SED quantity, only the coefficients of SIZE and E-RATIO are statistically significant. The coefficient of SIZE is positive and statically significant at 1% while that of E-RATIO is negative and only mildly significant at 10%. Therefore, we can reject the null hypothesis predicting no relationship between SIZE and QNT. Consistent with legitimacy theory, this confirms size as an important determinant of SED level disclosed by listed Nigerian oil and gas companies. This suggests that large companies are more conscious of their visibility and employ SEDs for legitimation purposes. We can as well reject the null hypothesis postulating no significant relationship between E-RATIO and SED quantity, and conclude that there is a mild negative relationship between the two variables. This implies that with evidence of high management efficiency, managers tend to provide less SEDs. However, managers provide more SEDs as legitimation tool, if they record poor efficiency ratio. The rest of the variables exhibit no significant relationship with QNT.

Table 5
Pooled OLS with panel corrected standard errors

Model Dependent variable	III LOG_QNT		IV LOG_QLT	
	Coef.	PCSE	Coef.	PCSE.
	LOG_SIZE	0.2435***	0.0474854	0.0114***
EPS	-0.0000134	0.0001446	4.34E-06	8.35E-06
LEV	0.4087005	0.3093603	0.03556**	0.0158
E-RATIO	-0.1266*	0.0740605	-0.00799**	0.003047
LIQ	0.0005133	0.0037637	0.0001534	0.000246
LOG_TAX	0.0561925	0.0463583	0.0006184	0.003072
CONSTANT	-0.7521799	0.6254577	-0.1731***	0.061899
Goodness of fit and diagnostic tests				
R-squared		32.37%		23.31%
Wald Chi-square		157.16***		33.17***

***significant @ 1%, **significant @ 5%, *significant @ 10%,

Results in Table 5 under QLT model show that three variables (namely, SIZE, LEV and E-RATIO) out of the six examined, are significant determinants of quality of SED by Nigerian oil and gas companies. The

coefficient of SIZE is positive and statistically significant at 1%. This result suggests that although the quality of disclosures is generally low, large companies make some efforts to provide qualitative disclosures through some level of compliance with some GRI guidelines. Similarly, the coefficient of leverage is also positive and statistically significant at 5%. This may be a further confirmation of the way in which companies employ SED as a legitimation tool to satisfy creditors interested in social and environmental information. This implies that even the unsatisfactory quality disclosures by listed Nigerian oil and gas companies are perhaps being provided due to the influence of creditors. Therefore, the result portrays SED efforts as strategies to gain or maintain legitimacy from creditors interested in SED quality. On the overall, the result suggests exploitation of other vulnerable stakeholders. As such, this is better understood from the perspective of vulnerability and exploitability analytical framework. On the contrary, the coefficient of E-RATIO is negative and statistically significant at 5%. This result indicates that managements use SEDs as legitimacy tools by providing more SEDs when management efficiency is poor and vice-versa. Thus, in times of inefficiency, quality of disclosures may be enhanced to cover the inefficiencies. Other variables tested show no significant relationship with SED quality.

CONCLUSION

Empirical evidence documented in this study suggests that listed Nigerian oil and gas companies are exploiting the vulnerabilities of the Nigerian government and its citizens. One of the indicators of this phenomenon is the apparent opacity related to accounting disclosures by companies operating in the Nigerian oil and gas industry. As a specific example of this lack of transparency, we establish that listed Nigerian oil and gas companies disclose low quantities of social and environmental information on few aspects of GRI guidelines which are of interest to their legitimacy conferring stakeholders. Furthermore, the low quantity of social and environmental information disclosed by the companies is of inferior quality. These patterns of the disclosure are consistent with vulnerability and exploitability analytical framework (see, Belal *et al.*, 2013). Results from our pooled OLS with PCSEs indicate that corporate size is an important determinant of both quantity and quality of SED. Consistent with this finding as well as legitimacy theory, our descriptive statistics results show that the four largest companies in our sample make more SEDs in terms of both quantity and quality. This implies that listed Nigerian oil and gas companies do make attempts to respond to pressure imposed by the public and political visibility to provide a little bit of more SEDs. Therefore, we

conclude that SED practices of the Nigerian oil and gas companies in our sample are significantly influenced by their size and this reinforces the view of SEDs as legitimation tools. Similarly, the significant positive relationship between SED quality and leverage as well as the significant but negative relationship between the disclosure quality and management efficiency are explained by legitimacy theory. The positive relationship between leverage and SED quality suggests that listed Nigerian oil and gas companies try to comply with some GRI guidelines in disclosing a few SED items on which creditors have an interest. However, the significant negative relationship between management efficiency and SED quality denotes tendency of managements to disclose more social and environmental information. Thus, they disclose more information in this situation to divert the attention of stakeholders away from their unimpressive efficiency.

Future research may wish to re-examine the determinants investigated in this study by taking more recent ten-year period (say, 2014-2023). This will enable the documentation of either confirmatory evidence or findings which differ from ours. If contradictory findings are documented, the unfolding event/s responsible for the difference will have to be discussed.

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