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Firm-specific Attributes and Environmental Disclosure of Listed Oil and Gas Firms in Nigeria

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Abstract

This paper examines the relationship of specific oil and gas firms' attributes; firms age, board composition, financial performance, existence of foreign directors on the board and financial leverage with Environmental Disclosures (ED). Data were collected from the published annual reports of nine listed oil and gas firms quoted on the floor of the Nigerian Stock Exchange (NSE) as at 2018, for a period of seven years (2012-2018). Generalized Least Square (GLS) was used to test the hypotheses after satisfying the criteria of post estimation tests. The result established a positive and significant relationship between board composition, financial leverage, existence of foreign directors on the board and ED. However, firm age and financial performance was found not to have significant relationship with ED. The study recommended that NSE should pursue actualization of the standard for disclosing ED by listed Oil and Gas firms. Thereafter, this should be made criteria for the firms to be listed as obtainable in the South African Stock Exchange and other developed countries. It also recommended that Firms that so far comply with disclosing their EI should be motivated through tax incentives by the regulatory authorities to achieve an improved ED practice in Nigeria.

Keywords: *Environmental disclosure; firm specific attributes; oil and gas firms*

1. Introduction

Environmental Information (EI) falls within the class of information that is voluntary in disclosure by listed firms in Nigeria. Onyema (2015) posited that there are mandatory and voluntary disclosures as required by the NSE and other regulatory bodies that oversee the preparation, presentation and publication of financial information. However, in France, the law requires that annual report of companies should include details of their commitment

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towards environmental and social development (Adeeko, 2015; Adeeko, 2019). Likewise, in Sweden, all companies owned by the state are compelled to include evidence of sustainability commitment in their published annual reports. This requirement is however tailored in compliance with Global Reporting Initiatives (GRI) guidelines (Sholotan, 2016).

Awe (2017) pointed out that it is mandatory for companies operating in United State of America (USA), Denmark and the Netherlands to present information regarding the environment in which they operate. In Africa, The Johannesburg Stock Exchange (South Africa) has ED as one of the criteria for listing Companies on its floor for trading. ED has moved beyond being absolutely new to relatively new in Africa. It started gaining considerable attention in Nigeria right from 2013, moving from different phases with a focus on the need for firms to include EI in their disclosures without much emphasis on the circumstances that calls for such disclosures. Ayoola (2017) established that absence of standardized guidelines and lack of commitment on the part of quoted firms hinders the disclosure of EI in Nigeria. Uwaoma and Ordu (2016) revealed that firms in different industries faced challenges on how to measure, how to define and how to select appropriate disclosure indicators regarding ED. This is despite the fact that such disclosure is imperative for sustainable development (Ironkwe & Success, 2017; Simranjeet & Harwinder, 2015).

Previous studies have made efforts to explore disclosure behavior, the need for EI, the relationship between EI and firm performance, challenges of disclosure of EI and environmental accounting practices amongst others (Vasanth, Selvam and Mahalingam, 2012, Gibassier, 2014, Kakanda and Ishaku, 2015, Thabit and Jasim, 2016, Abiola, 2017, Abubakar, Moses and Inuwa, 2017, Alawiye-Adams and Akomolafe 2017, Amaechi and Nwankwoeke 2017, Egbunike and Okoro 2018, Omoye and Wilson-Oshilim, 2018 and Udo, 2019). Scanty evidence was found as to the combination of the relationship between firm attributes as determinants of environmental reporting using firm age, board composition, financial performance, financial leverage and existence of foreign directors on the board as proxies for factors influencing voluntary EI disclosures especially in the Oil and Gas sector in Nigeria.

Consequent upon the existing gap, this paper attempts to assess the relationship between some of these variables and disclosure practices of listed Oil and Gas firms in Nigeria. The rest of the paper is as follows; section 2 examines the literature and hypotheses developments for the study. This is followed by section 3 where the methodological approach for the study was discussed. The result was discussed in section 4. Section five focused on conclusion, policy implications and recommendations for the study.

2. Literature review and hypotheses development

2.1 The concept of environmental disclosure

Adapting from Chaklader and Gulati (2015), Environmental disclosure practices are means of communicating to the stakeholders, the impact of the firm's activities on the environment. The central objective of ED is to communicate the firm's environmental performance to the report reader (Azzone, Brophy, Noci, Welford, & Young, 1997). Studies in Nigeria such as that of Abiola (2017); Abubakar, Moses, and Inuwa (2017); Alawiye-Adams and Akomolafe (2017); Amaechi and Nwankwoeke (2017); Egbunike and Okoro (2018); Omoye and Wilson-Oshilim (2018); Udo (2019) revealed evidences of empirical literature on disclosure practices, impact, challenges and prospect of ED on various sectors of listed firms. Vasanth, Selvam and Mahalingam (2012); Gibassier (2014); Kakanda and Ishaku (2015) affirmed the importance of including sustainability report in the firm's annual report though, Thabit and Jasim (2016)in their study on Oil and Gas firms operating at Kurdistan region (KRG) revealed a continuous weakness on EI disclosure practices of oil refining companies. The study stressed that annual financial statements of companies operating in the region contains a little EI or sometimes non-existent of EI.

2.2 Hypotheses development

The firm age: This is measured by the date of incorporation and it is an important variable that enhance a firm towards expressing its obligations to the environment in which it has attained a lofty height (Oyedokun, Fowokan, Hassan & Akintoye, 2016; Innocent & Okafor, 2018). The older a firm becomes, the more it should be willing to voluntarily express how much effort and commitment it has made in ensuring sustainable development towards the environment in which it operates and not just consider its financial obligations toward the shareholders alone (Welbeck, Owusu, Bekoe, & Kusi, 2017). Findings from prior studies found firms age to be significant to voluntary disclosure of EI (Benjamin, Okpanachi, & Muhammad, 2017; Elshabasy, 2018; Welbeck et al., 2017). In contrary, Akbas (2014) revealed that firm age is not statistically significant to the firm choice of either disclosing or

withholding environmental information in their annual report as a firm is naturally born to disclose such information that will only promote their profitability, especially if its disclosure is not imposed by law or other regulations. Okoye and Adeniyi (2018) found company age does not affect voluntary disclosure of EI. It is expected that as a firm grows in age, with a level of exposure and experience that must have been gathered in the process of growth, the consciousness of the board and those charged with responsibilities to steer the affairs of the company should awaken to the firm's contractual relationship and not only focused on their responsibilities to the shareholders but also give consideration to the environment in which it operates. Consequent upon the paper hypothesized that:

H1: Firm age has no significant relationship with ED

Board composition: This is defined as the proportion of executive and non-executive directors on the board (Uwuigbe, Egbide & Ayokunle, 2011).The composition has been used differently and compared against ED practices by listed firms. Rabi (2019) established a positive relationship between the term board composition and the level of environmental disclosure.His study adopted the number of directors, board ownership, and board independence as variables for measuring board composition. Jizi (2017) introduced percentage of females on boards as a proxy in measuring board composition.Findings from his study revealed that gender issue boosts the legitimacy of ED.Also, board with higher female participation was found to have positive influence on ED. Uwuigbe, Egbide and Ayokunle (2011) also found board composition to be positive and significant firm's commitment to environmental disclosures. This study is however tailored towards the adoption of Uwuigbe et al. (2011) with the level of the measurement of board composition as "proportion of executive and non-executive member on the board" as this measurement has gained much consideration by previous researchers. Based on these, the paper hypothesized that:

H2: Board composition has no significant relationship with ED

Financial performance: Jones (2013) opines that financial performance is a strong factor that attracts the interest of existing shareholders as well as potential ones whose interest is beyond profit sharing but also how environment could be revived. Olusegun (2012) found financial performance, which was measured by Return on Equity (ROE) to be positive and significant to firms' voluntary disclosure of environmental information. Adediran and Alade (2013) also found that in measuring performance, return on equity also have positive and significant relationships to ED. However, Egbunike & Okoro, (2018) found that Green Accounting indicators have negative and insignificant relationship with profitability of firms. Net profit margin and Return on equity was found to have negative and insignificant relationship with ED and firm performance (Ezeagba, John-Akamelu, & Umeoduagu, 2017). Akbas (2014) considered profit as a yard stick for the determination of firm's performance. However, profitability was found in his study to have a negative and insignificant influence on firm's culture of disclosing environmental information. In line with these positions, the study hypothesized that:

H3: Firm financial performance has no significant relationship with ED

Financial leverage: Adenugba, Ige, and Kesinro(2016) explained financial leverage as the use of debt to acquire more assets. A firm with a moderate level of financial leverage is expected to disclose its environmental commitment towards assuring the populace that the firm is financially buoyant. Leverage is employed to increase the return on equity. However, an excessive amount of financial leverage increases the risk of business failure. Olusegun (2012) found financial leverage to be positive and significant on firm's willingness to disclose EI. Egbunike and Tarilaye (2017) also found financial leverage to have a positive influence on firm's willingness to disclosure voluntarily its EI. In contrary, Adeniyi and Adebayo (2018) found financial leverage to be insignificant to firms' voluntary disclosure of EI. Ofoegbu and Odoemelam (2018) established that firms' commitment to voluntary disclosure of EI in the published annual report is not induced by level of its financial leverage. Akbas (2014) found financial leverage to be statistically irrelevant to the disclosure of EI. Ohidoa, Omokhudu and Oserogho (2016) found financial leverage not to significantly influence the disclosure of environmental information. Barnali and Puja (2015) found financial leverage to be insignificant to firms' commitment to the disclosure of environmental information. This implies that the ratio of debt to equity does not influence firms to wake up to its environmental responsibilities. Financial leverage was found not to have significant influence on firms' voluntary ED among listed firms (Adeniyi & Adebayo,

2018).A study by Kiende and Karambu (2016) revealed that financial leverage has no significant effect on voluntary ED by listed firms. These lead the study to formulate hypothesis that:

H4: Firm leverage level has no significant relationship with ED

Influence of foreign directors: According to Dawar and Frost (1999), Influence of foreign directors on the board should be considered a great variable to motivate firm to disclose its commitment to environmental issues. Many indigenous firms are looking forward to collaborations with multinational firms towards moving their operations beyond the shores of Nigeria and as well gain international acceptability, global comparison and to attract more international subscribers beyond the local environment in which they operate. Al-Amarneh, (2014) found that the inclusion of foreign personality as a member of the board was found to play a significant role in influencing firms' commitment, values and performance in the disclosure of ED. Odera, Scott, and Gow (2016) revealed that firms with no trace of foreign directors are found to disclose more information on environmental activities than those with foreign directors. In contrary, Taufik, Widyastuti and Yam (2017) found that having foreign directors among the board members goes a long way in influencing firms' commitment to environmental activities. The hypothesis in relation to this states that:

H5: Existence of foreign directors on the board has no significant relationship with ED.

2.3 Theoretical framework

The Legitimacy Theory and contingency theory were adopted for this study. The legitimacy theory could be traced to Dowling and Pfeffer (1975) It rests on the concept of "Social contract" with the assumption that social contract exist between corporations and individual member of the society and in order to bridge the legitimacy gap between the firm and the environment in which its operation is carried out, it is pertinent that various disclosure strategy need to be considered. However, ED is perceived a strong tool for influencing society's perception and convey the extent of their practical involvement to the society in which it operates (Ajape, 2019). Contingency theory seems to be suitable in linking the disclosure of EI by listed firms, especially when the disclosure of EI is considered to be voluntary and may be induced by certain firm's attributes and external factors or both (Ajape, 2019). Contingency theory could be traced as far back as 1964 and was credited to the work of Australian Psychologist Fred Edward Fielder who in his work linked the effectiveness of a leader to the personality of the leader and the situation in which the leader operates. A firm could as a result of its quest towards creating a good name and achieving social acceptance which will in turn, generate a more competitive advantage and result in the creation of a smooth operating environment aside from winning the interest of investors who are so keen about sustaining the environmental embrace contingency approach to ED.

3. Research Methods

The study adopted a quantitative research approach. Secondary data were obtained from published annual reports of the twelve (12) listed Oil and Gas firms as at 2018 which formed the population of the study. Oil and Gas firms were considered for the study due to their environmental sensitivity. Three (3) of the firms were dropped due to non-availability of annual reports as at the date of the study thereby, having nine (9) firms as the adjusted population for the study. Data collected covered a period of seven (7) years, from 2012 to 2018, bearing in mind the period of compliance with International Financial Reporting Standards (IFRSs) regulations. Generalized Least Square was used in estimating the regression, modified Wald test was utilized in testing for heteroskedasticity and multicollinearity test was conducted to check for correlation among the explanatory variables.

3.1 Model specification

The regression model of the study is presented as follows:

$$ED_{it} = \int (Age_{it}, BC_{it}, FP_{it}, Lev_{it}, FD_{it})$$

$$ED_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 BC_{it} + \beta_3 FP_{it} + \beta_4 Lev_{it} + \beta_5 FD_{it} + \varepsilon_{it}$$

Where, ED= Environmental Disclosure, Age = years of existence right from the date of incorporation, BC = Board composition, FP = Firm performance, Lev = Financial leverage, FD= Evidence of foreign director's existence in the board of the company and Ɛ denotes the error term for variables not captured in the model (Table 3.1).

Table 3.1.: Variable definition and measurement

Variables	Measurements	Sources
ED	Kinder Lydenberg Domini (KLD) rating index	Adeniyi & Adebayo (2018); Ofoegbu & Megbulu (2016)
Age	Years of existence right from the date of incorporation	Haladu and Beri (2016)
BC	Proportion of executive and none executive member on the board	Uwuigbe et al. (2011)
FP	Proportion of Net income to Shareholders' equity(Return on equity)	Kiende and Karambu (2016)
Lev	Total debt divided by total equity	Ohidoa et al. (2016)
FD	Proportion of non-Nigerian on the board	Odera et al. (2016)

Age: years of existence, BC: Board composition, FP: Financial performance, Lev: leverage and FD: Foreign directors.
Source: Researchers' compilation (2019)

Measurement items for ED were adopted from Kinder Lydenberg Domini (KLD) rating index. The KLD also conforms to the Global Reporting Initiative framework as they are both used in aggregation (Fonseca, 2010). The environmental protection (EP) sub group focused on six (6) operational measures relating to the oil and gas sector. For all operational measures reported, a score of "1" was assigned and those not reported, "0" was assigned. This conformed to methodology deployed in related annual report disclosure studies (Lipunga, 2015; Oboh, 2018; Okaro & Okafor, 2016). The score for each of the years (2012 – 2018) was then obtained and the weighted average was computed to obtain one score for the variable (Table 3.2).

Table 3.2.: Operational measures of ED variables

Group	OPERATIONAL MEASURES
Environmental Protection	• Pollution Control • Waste management • Biodiversity and Conservation • Environmental impact of transporting goods and materials. • Environmental Protection Awards. • Environment Friendly initiatives.

Source: Adopted from Adeniyi and Adebayo, 2018; Ofoegbu and Megbulu (2016)

4. Results and Discussion

4.1. Descriptive Analysis

Descriptive statistics of the explanatory variables and the explained variable as observed (Table 4.1) revealed the average level of compliance to ED by sampled firms as 32.5% with a minimum of 0% level of disclosure and a maximum of 83.3% level of disclosure. The minimum disclosure could be as a result of the fact that the disclosure of commitment to environmental activity is voluntary. Thus, spending on environmental disclosure is immaterial and therefore, may not need to be disclosed in the published annual report. The results also revealed standard deviation of 0.24 (24%) which shows low variability across the oil and gas firms as regards the extent of voluntary ED. The average age of the firms is presented in table 4.1 above as 39 years (39.111) with a standard deviation of 18.16, the difference between the average age and the standard deviation is 20.951. This implies that there is low variation in the age of the firms. The minimum and maximum age of firms is 3years and 67years respectively. The mean of board composition is 0.425 and the standard deviation of 0.22 shows moderate variation with respect to board composition across the sampled listed oil and gas firms. The minimum and maximum board compositions as indicated (Table 4.1) are 0.143 and 1 respectively.

The mean of financial performance as indicated by the average of return on equity is 5.4% approximately, with a standard deviation of 0.667 which shows a very high variability in financial performance among the sampled firms within the duration covered by the study. This shows that some firms perform better than others do. The minimum and the maximum as shown by the table are - 4.04 and 1.16. Hence, the range is 2.88. It implies that, there is a very

wide gap between the value of the highest return on equity and the lowest return on equity of the firms. Leverage has a mean of 2.738 and a standard deviation of 3.316. The difference between the mean and the standard deviation is 0.578. This revealed a high variation in the debt capitalization status of the firms. The minimum and maximum levels of leverage are -2.574 and 18.544 respectively. Foreign director has an average of 1.651 and the higher standard deviation of 2.119 as compared with the mean shows that there is wide dispersion in proportion of foreign directors that constitute the members of the board across the firms. Minimum and maximum numbers of foreign directors are 0 and 7 respectively.

Table 4.1: Result of Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
ED	63	.325	.24	0	.833
AGE	63	39.111	18.16	3	67
BC	63	.425	.22	.143	1
FP	63	.054	.667	-4.041	1.157
LEV	63	2.738	3.316	-2.574	18.544
FD	63	1.651	2.119	0	7

Source: Authors' computations using Stata 13 Software (2019)

Correlation matrix showed that AGE (0.377), BC (0.432), LEV (0.390) and FD (0.264) are positively correlated with ED practices. This implies that the variables move in the same direction with ED. More so, FP (-0.120) shows a negative relationship with ED, implying that it moves in the opposite direction to ED. It also revealed a positive correlation between BC (0.202), FP (0.060), LEV (0.246), FD (0.095) and the AGE. Also, positive relationship exists between LEV (0.156) and BC. However, there is a negative relationship between FP - (0.074), FD – (0.022) and BC. A positive relationship exists between FD (0.208) and FP. However, negative relationship exists between LEV – (0.718) and FP. Finally, there is a positive relationship between LEV (0.060) and FD. Then again, the relationship among the independent variables is not too strong to warrant multicollinearity problem in the model developed for the study.

4.2 Residual tests

To test for the existence of heteroskedasticity, Modified Wald for groupwise was utilised. This revealed chi^2 of 21053.63 with p-value of 0.0000, indicating the presence of heteroskedasticity therefore, a constant variation in the value of the residual (homoscedastic) is rejected. To show whether there is a correlation among the explanatory variables, a multicollinearity test was conducted. The Variance Inflation Factor (VIF) was carried out and the values of the explanatory variables revealed a value that was less than 10 and a tolerance value for all the variables is greater than 0.10 (threshold). This shows that there is an absence of multicollinearity. To choose between the random and fixed effect model, the Hausman specification test was carried out. The result of the Hausman test revealed that the value of chi^2 is 10.95 and the prob>chi 0.0523. The insignificant value as reported by the probability of chi2 indicates that the Hausman test is in favor of the random effect model. Further to this, Breusch and Pagan lagrangian multiplier test for random effect was conducted to choose between the random effect result and OLS regression. The result further showed chi2 of 35.67 with the p-value of 0.000. This implies that random effect regression model should be interpreted. However, due to the problem of random effect heteroskedasticity, Generalised Least Square regression is more suitable to analyze the data.

Table 4.2: Correlation matrix results

Variables		(1)	(2)	(3)	(4)	(5)	(6)
(1)	ED	1.000					
(2)	AGE	0.377*	1.000				
		0.002					
(3)	BC	0.432*	0.202	1.000			
		0.000	0.112				
(4)	FP	-0.120	0.060	-0.074	1.000		
		0.348	0.639	0.563			
(5)	LEV	0.390*	0.246	0.156	-0.718*	1.000	
		0.002	0.052	0.221	0.000		
(6)	FD	0.264*	0.095	-0.022	0.208	0.060	1.000
		0.037	0.461	0.863	0.101	0.642	

* shows the significance at the .05 level

Source: Authors' computations using Stata 13 Software (2019)

4.3 Tests of hypotheses

The firm age indicated a coefficient of 0.003 has a p-value of 0.073. This shows a positive and insignificant relationship between firm age and ED. Therefore, the study failed to reject the null hypothesis which states that firm age has no significant impact on ED. This conforms to the findings from the studies of Akbas (2014); Okoye and Adeniyi (2018) that firm age has no significant influence on ED. However, the findings contradict the result from the study of Innocent and Okafor (2018); Oyedokun et al. (2016). Their findings revealed a different view from that of this study. The coefficient of board composition (table 4.3) is 0.382 with the p-value of 0.000. This indicated that board composition is significant. It further revealed a positive and significant relationship between board composition and ED. By implication, it means the larger the population of the people on the board, the more the likelihood of environmental disclosure. This could be due to the fact that good corporate governance entails responsibility and due regards to the interest of all stakeholders, including the environment in which firms carry out their operations. The findings provide evidence for rejecting the null hypothesis which states that board composition has no significant relationship with ED by listed firms in Nigeria. This finding conforms to the result of Ofoegbu and Odoemelam (2018); Rabi(2019) and Uwuigbe et al. (2011) who found in their studies that ED could provide a means through which firms communicate their involvement in environmental related activities to all those affected by their business operations.

The coefficient and p-value of 0.035 and 0.547 respectively indicated that financial performance has a positive and insignificant relationship with ED. Therefore, the study fails to reject the null hypothesis which states, that financial performance has no significant relationship with ED by listed firms in Nigeria. The finding is however in contradiction to the submission of Egbunike and Okoro (2018); and Ezeagba et al. (2017).They found a positive and significant relationship between ED and financial performance in their studies and further concluded that the disclosure of environmental information in a uniform manner by firms will enhance control and measurement of performance. The firm leverage has coefficient of 0.025 with p-value of 0.034. This signifies that leverage is positively and significantly related to ED of sampled oil and gas firms in Nigeria at 5% level of significance. By implication, it means an increase in leverage will enhance ED. Firms with a larger loan capital (debt) might be under the obligation to disclose environmental information in order to attract investors who are interested in firms commitments to environmental issues. This provides evidence for rejecting the null hypothesis which states that leverage has no significant relationship with ED by listed firms in Nigeria. The result conforms to the findings of Egbunike and Tarilaye (2017) and Olusegun (2012). The result, however contradicts the findings of Adeniyi and Adebayo (2018) in their study on the effect of financial leverage on voluntary disclosure among listed firms in Nigeria.The result showed that existence of foreign directors as a member of the board has a positive and significant relationship with ED as indicated by the coefficient of 0.024 at 5% level of significant (p-value of 0.043). By implication, it means inclusion of foreign directors as member(s) of the board will improve level of ED. This conforms with the findings of Al-Amarneh (2014) and Taufik et al. (2017) who found in their studies that foreign personality as a member of the board plays an important role in influencing firm commitment, values and performance in the disclosure of their environmental involvement. Therefore, the null hypothesis, which states that existence of foreign director on the board has no significant relationship to ED by listed firms in Nigeria, was rejected. The result however contradicts the findings from the study of Odera et al. (2016).

Table 4.3: Cross-sectional time-series GLS regression

ED	Coef.	St.Err.	t-value	p-value	Sig
AGE	0.003	0.001	1.79	0.073	*
BC	0.382	0.109	3.50	0.000	***
FP	0.035	0.058	0.60	0.547	
LEV	0.025	0.012	2.12	0.034	**
FD	0.024	0.012	2.03	0.043	**
Constant	-0.048	0.068	-0.71	0.478	
Prob> chi2	0.000	Chi-square	42.524		
Number of obs	63.000				

**** p<0.01, ** p<0.05, * p<0.1*

Source: Authors' computations using Stata 13 Software (2019)

5. Conclusions, policy implications and recommendations

The study concluded that a positive and significant relationship exists between board composition, firm financial leverage, the existence of foreign directors on the board and ED. Also, that the relationship between firm age, financial performance and environmental disclosure is not significant as evidenced from the findings.

The policy implications emanated from this study is directed towards encouraging foreign participation on the board of listed companies. Involvement of foreign directors was found to induce listed firms to be more conscious of the environmental dynamics and the demands of various stakeholders as they pursue economic utilities along the

side. Furthermore, NSE, Securities Exchange commission (SEC) and Financial Reporting Council of Nigeria should provide a common index like that of the GRI and KLD to allow for the same measurement of firms' environmental disclosure as well as encourage listed firms operating in Nigeria to improve upon their current level of ED as they concentrate on their Corporate Social Responsibilities (CSR). This will curtail potential conflict between populace living within the host environment in which the firms operate aside from generating positive image for them. Also, regulatory bodies should make it mandatory for all listed firms to disclose their environmental commitments in their published annual reports. This would help to introduce and explain companies' potentials to investors, driving the fluidity of capital market, guaranteeing more effective allocation of capital, decreasing capital costs and achieving a more positive communication with investors as perfecting the information disclosed.

Based on these, the study recommended that NSE should pursue actualization of the standard for disclosing ED by listed Oil and Gas firm. Thereafter, it should be made as criteria for the firms to be listed as obtainable in the South African Stock Exchange and other developed countries. Firms that so far comply with disclosing their EI should be motivated through tax incentives by the regulatory authorities to achieve an improved ED practices in Nigeria.

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Appendices

Appendix I: STATA Output

```
. xtset ID YEAR, yearly
       panel variable:  ID (strongly balanced)
        time variable:  YEAR, 2012 to 2018
                delta:  1 year
. asdoc sum ED AGE BC FP LEV FD
(File Myfile.doc already exists, option append was assumed)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ED	63	.3253968	.2402742	0	.8333333
AGE	63	39.11111	18.15978	3	67
BC	63	.4254283	.2201043	.142857	1
FP	63	.0541529	.6672	-4.04101	1.156873
LEV	63	2.737711	3.316022	-2.5741	18.54377
FD	63	1.650794	2.118724	0	7

```
. asdoc reg ED AGE BC FP LEV FD
(File Myfile.doc already exists, option append was assumed)
```

Source	SS	df	MS		
Model	1.44240157	5	.288480313	Number of obs	63
Residual	2.13696344	57	.037490587	F(5, 57)	7.69
				Prob > F	0.0000
				R-squared	0.4030
				Adj R-squared	0.3506
Total	3.57936501	62	.057731694	Root MSE	.19362

ED	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
AGE	.0025841	.001514	1.71	0.093	-.0004477	.0056159
BC	.3822934	.1149392	3.33	0.002	.1521317	.6124551
FP	.0347123	.0605785	0.57	0.569	-.086594	.1560186
LEV	.0248848	.0123377	2.02	0.048	.000179	.0495905
FD	.024099	.0125019	1.93	0.059	-.0009355	.0491336
_cons	-.0480974	.0712242	-0.68	0.502	-.1907214	.0945267

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ED

         chi2(1)      =     1.73
         Prob > chi2  =   0.1889
```

Variable	VIF	1/VIF
LEV	2.77	0.361268
FP	2.70	0.370153
AGE	1.25	0.799912
FD	1.16	0.861849
BC	1.06	0.944795
Mean VIF	1.79	

```
. swilk resid

                    Shapiro-Wilk W test for normal data
```

Variable	Obs	W	V	z	Prob>z
resid	63	0.97060	1.662	1.098	0.13604

```
. asdoc pwcorr  ED AGE BC FP LEV FD, star(0.05)sig
(File Myfile.doc already exists, option append was assumed)
```

	ED	AGE	BC	FP	LEV	FD
ED	1.0000					
AGE	0.3766*	1.0000				
	0.0023					
BC	0.4315*	0.2023	1.0000			
	0.0004	0.1119				
FP	-0.1203	0.0603	-0.0743	1.0000		
	0.3477	0.6388	0.5626			
LEV	0.3897*	0.2463	0.1563	-0.7183*	1.0000	
	0.0016	0.0516	0.2212	0.0000		
FD	0.2638*	0.0945	-0.0221	0.2083	0.0597	1.0000
	0.0367	0.4613	0.8632	0.1014	0.6423	

```
Fixed-effects (within) regression               Number of obs      =        63
Group variable: ID                              Number of groups   =         9

R-sq:  within  = 0.0641                         Obs per group: min =         7
       between = 0.1037                                        avg =       7.0
       overall = 0.0916                                        max =         7

                                                F(5,49)            =      0.67
corr(u_i, Xb)  = -0.4970                        Prob > F           =    0.6469
```

ED	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
AGE	.0097514	.0092237	1.06	0.296	-.0087843	.0282871
BC	.0640508	.1314766	0.49	0.628	-.2001614	.3282629
FP	.0103715	.0397299	0.26	0.795	-.0694688	.0902118
LEV	.0036104	.0089517	0.40	0.688	-.0143788	.0215996
FD	-.0338203	.0260849	-1.30	0.201	-.0862399	.0185994
_cons	-.0378546	.4127147	-0.09	0.927	-.8672359	.7915267
sigma_u	.24961374					
sigma_e	.11284043					
rho	.83031762	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(8, 49) =    15.93                 Prob > F = 0.0000
```

```
. asdoc xtreg  ED AGE BC FP LEV FD, re
(File Myfile.doc already exists, option append was assumed)

Random-effects GLS regression                   Number of obs      =        63
Group variable: ID                              Number of groups   =         9

R-sq:  within  = 0.0189                         Obs per group: min =         7
       between = 0.2643                                        avg =       7.0
       overall = 0.2186                                        max =         7

                                                Wald chi2(5)       =      5.01
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.4149
```

ED	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
AGE	.0053868	.0028505	1.89	0.059	-.0002	.0109737
BC	.1084128	.1054387	1.03	0.304	-.0982433	.3150689
FP	.0181082	.040594	0.45	0.656	-.0614546	.097671
LEV	.0054487	.0089987	0.61	0.545	-.0121884	.0230859
FD	-.001673	.0191523	-0.09	0.930	-.0392108	.0358648
_cons	.0554535	.1393987	0.40	0.691	-.2177629	.3286699
sigma_u	.14743358					
sigma_e	.11284043					
rho	.63060339	(fraction of variance due to u_i)				

```
. hausman fe re, sigmamore
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
AGE	.0097514	.0053868	.0043645	.009378
BC	.0640508	.1084128	-.044362	.0916674
FP	.0103715	.0181082	-.0077367	.0116018
LEV	.0036104	.0054487	-.0018384	.0030845
FD	-.0338203	-.001673	-.0321473	.0200388

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

 Test:  Ho:  difference in coefficients not systematic

           chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =       10.95
         Prob>chi2 =      0.0523
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ED[ID,t] = Xb + u[ID] + e[ID,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ---------+-----------------------------
                  ED |    .0577317       .2402742
                   e |     .012733       .1128404
                   u |    .0217367       .1474336

        Test:   Var(u) = 0
                                chibar2(01) =    35.67
                            Prob > chibar2 =   0.0000
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (9)  =    21053.83
Prob>chi2 =      0.0000
. xtgls ED AGE BC FP LEV FD

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs      =        63
Estimated autocorrelations =         0          Number of groups   =         9
Estimated coefficients     =         6          Time periods       =         7
                                                Wald chi2(5)       =     42.52
Log likelihood             =  17.19496          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ED |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         AGE |   .0025841   .0014401     1.79   0.073    -.0002385    .0054067
          BC |   .3822934    .109329     3.50   0.000     .1680126    .5965742
          FP |   .0347123   .0576216     0.60   0.547     -.078224    .1476486
         LEV |   .0248848   .0117355     2.12   0.034     .0018837    .0478859
          FD |    .024099   .0118917     2.03   0.043     .0007918    .0474063
       _cons |  -.0480974   .0677478    -0.71   0.478    -.1808805    .0846858
------------------------------------------------------------------------------
```