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Board Characteristics and Integrated Reporting of Listed Oil and Gas Companies in Nigeria: Moderating Role of Profitability

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ABSTRACT

This study looks at how profitability influences the relationship between board composition and integrated reporting for eight (8) listed oil and gas firms in Nigeria over a fifteen-year period (from 2007 to 2021). On legitimacy theory, the theoretical literature was built. Data were hand-selected from chosen firms' annual reports and financial statements. Panel data were analyzed using Fixed Effects and Random Effects models. According to the findings, board size and gender diversity are moderated by profitability in relation to integrated reporting. The study, however, was unable to demonstrate any moderating impact of profitability on board independence. As a result, the study draws the conclusion that profitability plays a determining role in the relationship between board size and integrated reporting and between board gender diversity and integrated reporting. This study suggests that oil and gas companies keep their boards at a minimum size of eight (8) members in order to lower operating expenses and boost profitability. Similarly, oil and gas companies ought to cut back on the number of female directors..

1. Introduction

Beginning in the 19th century, people began to become conscious of how man's actions could harm the environment. This problem had been raised time and time again at numerous national and international meetings. According to Shonhadji (2018), environmental conditions around the world are continuously becoming worse. This is a result of environmental change, including the impact of industrialization on numerous nations, including Nigeria. Due to the negative impacts that frequently result from environmental pollution, which have a negative impact on citizen health and are not good for any living conditions, environmental issues in Nigeria are therefore highly important issues that must be taken into consideration.

The term "integrated reporting" refers to a reporting system that includes both financial and non-financial information in the financial statement report. According to Gokte et al. (2017), integrated reporting advances the integrated thinking that underlies the interdependencies between financial and non-financial information. As a result, the quality of information is improved and material issues that have an impact on the business are identified.

The ability of the company to create value over time is affected by a variety of circumstances, and integrated thinking takes these relationships into account. These elements include the capitals the company uses or its ability to respond to the legitimate needs and interests of key stakeholders; the way the company develops its business model and strategy to address the risks and opportunities it faces; and the firm's operations, performance, and results in terms of past, present, and future capitals (2013) The International Integrated Reporting Council (IIRC). The International Integrated Reporting Council (IIRC) divided the integrated reporting framework's content into guiding principles and content elements. The guiding concepts are strategic emphasis and future direction, information connectedness, stakeholder relationships, materiality, succinctness, completeness, and reliability, as well as consistency and comparability. While the content parts also cover the governance, business model, risk and opportunity, strategy and resource allocation, performance, outlook, company overview, and external environment, as well as the foundation for preparation and presentation 2015 (Schorger & Sewchurran).

Companies, particularly those in the oil and gas sector, contribute significantly to economic growth and development, but they also to air, water, and land pollution. Selven et al. (2022) backed the notion that because numerous parties, such as the Environmental Protection Agency (EPA), NNPC, had taken steps to solve the issue, environmental issues brought on by industrial activities could no longer be ignored. However, corporate disclosure and transparency are a major concern for company boards in emerging countries.

In Nigeria, corporate organizations seek to ensure consistency in reporting environmental operations while disclosing environmental information. There are no specific accounting standards, according to Okere et al. (2021); instead, regulating organizations like the Regulation Enforcement Agency Act of 2007 offer policies. In order to align with industry best practices, the agency provides corporations with environmental policy and suggested initiatives. According to Selven et al. (2021), integrated reporting is more of a voluntary endeavor, and it is yet unclear what factors businesses use to decide whether or not to participate.

According to the code of corporate governance, one of the variables that might be used to gauge the degree of integrated reporting is board characteristics, which involve the combination of individuals with various qualities that connect them together. According to Musa et al. (2020), the features of a board

of directors can be broken down into a variety of categories, including board independence, board size, board gender, and more. So, in this study, we evaluated the gender and size of the board.

The Financial Reporting Council of Nigeria's (FRCN) 2018 Corporate Governance Code. The governance code encourages public understanding of crucial corporate values and moral standards, including integrated reporting, which will strengthen businesses' integrity and advance commercial endeavors. According to this guideline, it is anticipated that businesses that exhibit sound board qualities will be prepared and eager to reveal their environmental operations. Based on the importance of board characteristics, the study adopted three aspect such as board size board independence and board gender diversity. Thus, prior empirical studies such as Agyemang et al., (2019), Selven et al., (2022), Kamwana and Ombati, (2018), Anatami et al., (2019) measured the influence of board size on firms disclosure performance with divergent outcome. Furthermore, study like that of Jahid et al., (2020), Oba and Fodio, (2012) and Naseem et al., (2017) examined the board characteristics of board gender on integrated reporting with mixed and divergent findings, which necessitate further study.

The fact that oil and gas corporations are naturally involved in environmental resources makes them a crucial subject to look into. Furthermore, existing work on integrated reporting (IR) focuses on the use of board characteristics rather than a measure of the interaction role of profitability, including board size, nationality, independent, executive, and non-executive directors. Due to these identified deficiencies, it is clear that this work closes them by introducing the moderating influence of profitability.

To this end, the questions is how does board characteristics influence integrated reporting in oil and gas companies in Nigeria and will profitability play a moderating role in the disclosure level? In this regard, the objective of this study is to examine the moderating effect of profitability on board size, board independence and board gender on integrated reporting. To achieve the mentioned objectives, the following null hypotheses are formulated for the study:

H_{01}: Profitability has no significant moderating effect on the nexus between board size and integrated reporting of listed oil and gas companies in Nigeria.

H_{02}: Profitability has no significant moderating effect on the association between board independence and integrated reporting of listed oil and gas companies in Nigeria.

H_{03}: Profitability has no significant moderating effect on the relationship between board gender and integrated reporting of listed oil and gas companies in Nigeria.

The remaining part of this study discuss the literature review, methodology, results, conclusions, recommendations, and references.

2. Literature Review

According to Jessop et al. (2019), integrated reporting is a reporting system that compiles both financial and non-financial transactions into a single record. By demonstrating the connection between financial and sustainability performance in a single document, integrated reporting increases transparency on company commitment. A uniform platform for governance, financial capital, manufactured capital, intellectual capital, social capital, human capital, and natural capital is provided via integrated reporting. Integrated reporting is really not only about reporting; rather, it is a component of superior business reporting that has more advantages (Muktar et al., 2016). Similarly, The importance of closely monitoring natural resources and the company's negative effects on the society in which it operates are emphasized by disclosure of environmental operations (Omoye & Wilson-Oshilim, 2018). Pollutions including noise, trash, hazardous emissions, spillages, and deterioration are among the environmental effects brought on by business activities, particularly those of those in the manufacturing and oil and gas sectors.

From an organizational standpoint, boards can be seen as a group of people who have gathered to work toward a shared objective when addressing board characteristics (Langton & Robbins, 2007). The most well-established governance structure to safeguard the interests of several stakeholders in the setting in which businesses conduct their operations is thought to be the board of directors. The board of directors has a strategic role in the company's decision-making and is positioned above the chief executive officer and other managers in the organizational structure. Important organizational assets include the skill sets and makeup of the board (Ljungquist 2007). The size, independence, foreign directors, and gender makeup of the board are the primary factors that are investigated (Walls et al., 2011; Ofoegbu et al., 2018; Rabi 2021; Khan, Al-Jabri & Saif, 2021). The size, independence, and gender of the board are the three main areas of emphasis in this study. Rarely has the same study evaluated all of these variables at once.

One of the crucial elements of board characteristics is board size, which refers to the total number of inside and outside directors who sit on a corporation's board. According to Adamu et al. (2020), the board may benefit from improved contact with the host community if there are more board members. Additionally, Agyemang et al. (2019) asserted that the size of the board affects its capacity to oversee and assess management and voluntary disclosure.

In order to safeguard the interests of shareholders, management must be regularly monitored by directors who are independent of the management (Amran et al., 2014). Independent directors are motivated to carry out their assigned duties and increase the profitability of businesses since they are external and have no link to the internal management of the companies (Puni & Anlesinya 2020). To eliminate any conflicts of interest, an independent management board is made up mostly of directors who are not connected to the company's executives and have few business dealings (Walls et al., 2011). According to Liao et al. (2015), a non-executive director is a member of a corporation's management board but not the administrative committee.

Companies must take into account board gender diversity because their selection as board directors sends a positive message to investors about the trustworthiness of the business. A highly contested part of board diversity is gender. Huse and Solberg (2006) discovered that women promote a more productive environment on boards because they are more devoted, energetic, and attentive. The decision-making process and board productivity are both

improved by female directors' lower ego-interest orientation (Galbreath et al., 2016). Having a diverse board is not only morally needed, but it will also enhance integrated reporting and increase a company's success. But a number of studies have found that having a gender diverse board is likely to boost business performance and shareholder value since female directors typically have higher expectations for themselves and for others in terms of caring, empathy, and concern (Naseem et al., 2017).

Profitability is a gauge of a business's power. It typically occurs when revenue exceeds operating costs. The ability of a business to turn a profit is known as profitability. The magnitude of the company's ability to generate a return on the invested cash is more important to the owner of the business. The shareholders and investors in the capital market who will buy the company's shares favor this ratio, which they use to gauge profitability using one of the ratios, specifically financial ratios. The greater the company's profitability, the more social information it will provide (Singh & Bagga, 2019). A company's net profit will rise if this ratio does as well. Stock prices and business values will increase once that takes place. Because return on asset measures how efficiently a company uses its working capital, it was employed in this study as a stand-in for profitability.

Due to its applicability to the connection between board features and integrated reporting, this study adopted the legitimacy theory. According to the legitimacy theory, corporations will publicly disclose environmental information and use environmental performance measures to gain public support for all economic initiatives. The corporation will get a number of advantages from environmental conservation initiatives, such as stakeholders' involvement in ethical environmental management (Anatami et al., 2019).

Environmental performance and the practice of disclosing social responsibility are frequently linked. In contrast to businesses with poor environmental performance, the former have a tendency to disclose their social responsibility. Companies are encouraged to exhibit their social responsibility by the higher level of profitability. However, the board of directors' role-playing exercise can be used to assess how well businesses manage their environmental information.

As a key component of board effectiveness, board size can be viewed as an essential corporate governance tool that may influence the extent of corporate voluntary disclosure, including integrated reporting (Allegrini & Greco, 2013). However, both theoretical and empirical literature provide contradictory justifications for the relationship between board size and integrated reporting.

AbdurRouf (2010) looked at the relationship between Integrated Reporting and company factors (firm size and profitability). On the Dhaka Stock Exchange (DSE), a sample of 120 non-financial companies that were listed was used. The content of corporate annual reports for the year 2008 was studied. The level of voluntary disclosure among the chosen firms was measured using an unweighted disclosure index. The results of the multiple regression analysis indicated a substantial positive relationship between board size and voluntary disclosure, suggesting that the level of disclosure is favorably correlated with board size.

Selven et al. (2022), Kamwana and Ombati, (2018), Anatami et al. (2019) measured the influence of board size on firms disclosure performance with divergent outcome. Also, Lai et al., (2016) found no significant impact of board size on the integrated reporting. Osazuwa and Che-Adam (2016) used cross-sectional data from 116 companies in Nigeria and showed that board size has a positive relationship with the degree of integrated reporting. Jizi et al. (2013) discovered a significant positive association between board size and integrated reporting while researching the relationship between corporate governance and integrated reporting in the US banking sector in order to address concerns about the quality of climate change disclosure.

In South Asian nations, Masud et al. (2018) investigated the impact of corporate governance components on environmental sustainability reporting performance (ESRP). The study took into account 88 listed businesses' sustainability reports from the Global Reporting Initiative (GRI) database from the years 2009 to 2016 and three (3) South Asian nations (Bangladesh, India, and Pakistan). The study took the theoretical frameworks into account. Examples include ideas based on agency, resource dependence, stakeholder, legitimacy, and political cost. Based on the empirical findings, board size significantly and adversely affects integrated reporting.

Haladu and Salim (2016) looked into board independence, however they concentrated on how it affected sustainability reporting and how environmental agencies acted as a moderator. The results show that environmental expertise and board independence have a favorable/direct link with the sharing of environmental knowledge. Additionally, was discovered that the board composition and the dual integrated reporting are negatively and statistically significant. Researchers Ashafoke and Ilaboya (2017) found a positive non-significant relationship between board independence and integrated reporting but a substantial negative link between foreign directors with the practice.

In a similar vein, Ahmed et al. (2017) investigated how board independence affected Malaysian publicly traded businesses' disclosure of their corporate social responsibility activities. The extent of CRS disclosure was determined via content analysis. Six themes—general, social, environmental, and human—were used to generate a 51-item index. Resources, the market, and various. OLS regression, or ordinary least squares regression, was used to evaluate data gathered from the annual reports and accounts of the sampled 450 companies out of a population of 2,700 companies. The association between board independence and firm CRS disclosure was examined using this. The study's findings showed that there was a statistically significant correlation between board independence and firm disclosure.

The research showed that higher board independence may give better oversight of the total business's financial reporting process (Anderson et al., 2004), and (Jackling & Johl, 2015) found a favorable influence on firm profitability using data from Indian enterprises. Additionally, (Beasley, 2019) discovered that a high level of financial statement fraud is inversely connected to the percentage of board independence on the board. In other words, managers of emerging market companies may anticipate an easy opportunity to manipulate the financial statements by favoring projects that are more advantageous to their own self-interest than to the firms' (Kochhar, Le et al., 2010).

In a developing market like Malaysia, Mohammed et al. (2019) looked into how gender diversity on boards affected how transparent information regarding the environment, society, and governance (ESG) was. 568 firm-year observations from 78 companies listed on the Bursa Malaysia make up the data set. The data's ordinary least squares regression analysis reveals that the inclusion of more female members on business boards considerably improves ESG disclosure rankings. However, the effects of board gender diversity differ when the various components are examined. This study adds to the sparse but expanding body of knowledge on the quality of ESG reporting and board gender diversity, particularly in emerging nations. Similar to this, Rabiu et al. (2018) assess how the gender of corporate board members affects the disclosure of energy information by Nigerian listed companies, while controlling for institutional strength (global competitiveness index).

The study uses content analysis techniques to elicit data on integrated reporting using GRI standards from the sampled companies. Regression analysis using random and fixed effects were performed on both direct and moderation models. Using random outcomes that were adopted based on the Hausman test results, the link between the research variables was explored. The survey discovered that, on average, the selected businesses acknowledged their energy usage. Regression analysis's overall findings showed a strong connection between board gender diversity and energy disclosure. The institutional strength moderation result was shown to have no bearing on the association between board gender and energy disclosure.

According to Ben-Amar et al. (2017), female boardroom participation has a favorable correlation with data sharing on climate change that is done freely. The findings show that gender diversity increases board effectiveness in managing stakeholders and implementing sustainability practices in their business operations. A 2019 study by Agyemang et al. looked at integrated reporting in Ghana in relation to board characteristics. In order to verify the hypothesis using OLS regression, the study analyzed panel data from the companies' annual reports that covered 15 financial years. The study's findings show that female directors significantly and negatively affect integrated reporting in Ghana.

3. Methodology

A correlational research design was used in the study. The annual reports and financial statements of oil and gas businesses from 2007 to 2021 were used as the data's primary source. For the study, multiple regression analysis was used. To confirm that the model is a best linear unbiased estimator (BLUE), post estimation tests such multicollinearity, heteroskedasticity, and the Hausman specification test were carried out. Eleven (11) people made up the study's population, while 8 publicly traded oil and gas enterprises made up the sample firms. The sampled firms are put on asterisk sign on the table.

Table 1

Population and Sample of the Study

S/N	Company	Sample
1.	11 Plc	*
2.	Ardova Plc	*
3.	Capital Oil Plc	
4.	Conoil Plc	
5.	Eterna Plc	*
6.	Japaul Gold & Ventures Plc	*
7.	MRS Oil Nigeria Plc	*
8.	Oando Plc	*
9.	RAK Unity Petroleum Company Plc	
10.	Seplat Pet. Development Company	*
11.	Total Nigeria Plc	*

Source: Field Work, 2023

In line with the work of Baharudin et al. (2020), the model of the study is

$IR_{it} = \beta_0 + \beta_1 BS_{it}*PROFDUM_{it} + \beta_2 BIND_{it}*PROFDUM_{it} + \beta_3 BGDT*PROFDUM_{it} + e_{it}$

Whereas: IR = Integrated reporting (Integrated reporting was derived as the absolute value of an index using principal component analysis based on the 10 components of integrated reporting (see Appendix A1) frame work as used by Baharadin et al. (2020).

BS = Board size was measured by the total number of directors on the board.

BIND = Board independence was measured by the percentage of non-executives directors to total number of directors in the board.

BGDT= Board gender diversity was measured by the number of female directors on the board.

PROF = Profitability was measured by return on assets, which was converted into dummy variable (1 for profit, 0 for loss).

i= number companies, I = 8, t= number of years, t = 15

e = is the error term

β_0 = Intercept of the model "Constant", β = 1, 2 . . . are parameters to be estimated

Variable Definition, Measurement and Source

Table 2

Variables, definition, measurement and sources

Variable	Definition	Measurement	Sources
Dependent			
IR	Integrated Reporting	Integrated reporting (10 Components of Integrated) Reporting	Baharadin et al. 2020
Independent			
BS	Board Size on the board	Number of Directors Ombati R, (2018)	Kamwana,M.K., &
BIN	Board Independence	Percentage of independent directors to total number of directors in the, board Nurkholis	Antami D.N, Nurkholis & Roekhudin.(2019)
BGDT	Board Gender Diversity	Percentage of female directors to total number of directors in the board	Rahman, & Post (2010)
PROF	Profit	Return on assets	Agrawal, A., & S Chadha (2005)

Source: Fieldwork, 2023.

4. Results and Discussion

The presentation, analysis, and interpretation of the data are all covered in this section. Descriptive analysis, diagnostic tests, regression analyses, testing of hypotheses, and discussion of results make up this part. The data for the paper's model is in Appendix A2, whereas the data used to determine the dependent variable (integrated reporting) is in Appendix A1. The raw STATA results from the data in Appendix A2 are provided in Appendices B1 through B2. The descriptive statistics findings are shown in Table 1 together with the observations, mean, standard deviation, minimum mean, and maximum mean.

Table 3

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
IR	120	.479	.877	.004	5.754
BS	120	8.858	2.353	4	14
BIND	120	67.01	12.617	40	90
BGDT	120	13.379	9.507	0	37.5
BSPROFDUM	120	7.475	3.859	0	14
BINDPROFDUM	120	56.429	27.062	0	90
BGDTPROFDUM	120	10.805	10.122	0	37.5

Source: STATA 14.2 Appendix A2

From Table 3, the number of observations is 120, which was derived from the product of the number of firms (8) and the number of years (15). Furthermore, IR (integrated reporting) averages .479 with a standard deviation of .877, which is higher than the mean suggesting that there is a high level of volatility in integrated reporting, which provides the basis to be treated in this study as the dependent variable. In addition, the minimum mean is .004 and the maximum mean is 5.754. Also, BS (board size) approximately averages 9 members with a standard deviation of 2 members and a minimum mean of 4 members and a maximum mean of 14 members. Furthermore, BIND (board independence) averages 67%, with a standard deviation approximately 13 members and a minimum mean of 40 members and maximum mean of 90 members. More so, BGDT (board gender diversity) revealed an average of 13 members with a standard deviation of approximately 10 members and a minimum of 0 and maximum 38 members. Similarly, BSPROFDUM (board

size profit dummy) revealed an average number of 7 with a standard deviation of 4 members and minimum and maximum number 0 and 14 respectively. Likewise, BINDPROF (board independence profit dummy) 56 average members with standard deviation of 27 members and minimum and maximum number 0 and 90 respectively. Additionally, BGDTPROFDUM (board gender diversity profit dummy) approximately average of 11 members, with a standard deviation of 10 members and a minimum and maximum mean of 0 and 38 respectively.

The results of heteroskedasticity test are contained in Table 4 for the two models.

Table 4

Cameron & Trivedi's decomposition of IM-test

Source	chi2	Df	P
Model 1	5.750	9	0.764
Model 2	25.600	9	0.002

Source: STATA 14.2 Appendix A2

From Table 4, the p-value of Model 1 is .764, which is not significant, that is, it is greater than .05, suggesting that the data does not have heteroskedasticity. However, the p-value of Model 2 is .002, which is significant, requiring that Model 2 needs robustness check. Furthermore, the results of multicollinearity test are reported in Table 5for the two models.

Table 5

Results of Multicollinearity Test

	Mean VIF
Model 1	1.10
Model 2	2.13

Source: STATA 14.2 Appendix A2

From the results in Table 5, both models show no presence of Multicollinearity because the mean variance inflation factors (VIF) are less than 3.3 (Gujarati, 2005). Similarly, the results of panel effects tests are reported in Table 6.

Table 6

Results of Panel Effects Tests

	Chi^2	p-Value
Model 1	45.68	.000
Model 2	142.79	.000

Source: STATA 14.2 Appendix A2

The results in Table 6 show that there are panel effects in both models. Therefore, there is further need to carry out Hausman Specification Test. The results of the test are presented in Table 7.

Table 7

Results of Hausman Specification Test

	Chi^2	p-Value
Model 1	4.39	.2228
Model 2	15.26	.016

Source: STATA 14.2 Appendix A2

Based on the results in Table 7, the appropriate analytical technique for Model 1 is Random Effects Model (REM), while the appropriate analytical technique for Model 2 is Fixed Effects Model (FEM). Therefore, the results of REM regression for Model 1 are reported in Table 8.

Table 8

Results of REM Regression (Without Moderation)

IR	Coef.	St.Err.	t-val.	p-val.	[95% Co.	Interval]	Sig
BS	-.01	.047	-0.21	.83	-.102	.082	
BIND	.021	.007	3.21	.001	.008	.034	***
BGDT	.006	.009	0.65	.517	-.011	.023	
Constant	-.935	.676	-1.38	.167	-2.261	.39	
Overall r-squared		0.009		Number of obs		120	

Chi-square	11.567	Prob > chi^2	0.009	
R-squared within	0.117	R-squared between	0.154	

*** *p<.01, ** p<.05, * p<.1*

Source: STATA 14.2 Appendix A2

Similarly, the results of FEM regression for Model 2 are reported in Table 9.

Table 9

Results of FEM Regression (With Moderation)

IR	Coef.	St.Err.	t-val.	p-val.	[95% Co.	Interval]	Sig
BSPROFDUM	-.056	.019	-2.99	.003	-.093	-.019	***
BINDPROFDUM	-.007	.004	-1.97	.051	-.014	0	*
BGDTPROFDUM	-.006	.003	-2.49	.014	-.012	-.001	**
Constant	1.369	.394	3.48	.001	.589	2.149	***
R-squared	0.220		Number of obs		120		
F-test	3.702		Prob > chi^2		0.014		

*** *p<.01, ** p<.05, * p<.1*

Source: STATA 14.2 Appendix A2

From Tables and 9, the prob > chi^2 in the two models were found to be significant, meaning that the results can be used to explain the models because, their p-values are significant. Also, in Table 6, both board size and board gender diversity were found not to be significant. However, as shown in Table 7, when the two variables were moderated by the use of profitability dummy, their p-values changed to become significant. Therefore, the study can conclude that profitability (proxied by profitability dummy) is a moderating factor for both board size and board gender diversity.   However, there is no evidence to support the same for board independence. Board size revealed a negative and significant effect on integrated reporting with a coefficient value of – 0.056 and p value of -0.003. Therefore, the study reject hypothesis 1 which state that Profitability has no significant moderating effect on the nexus between board size and integrated reporting of listed oil and gas companies in Nigeria and concludes that board size has a negative significant effect on integrated reporting. Therefore, the study is supported by the work of Masud et al. (2018). The moderator profitability revealed that board size is found to have a negative and significant effect on integrated reporting of listed oil and gas companies in Nigeria. Therefore, the oil and gas firms should maintain the minimum acceptable board size of eight (8) members so as to reduce the cost of running business in order to increase profitability.

Integrated reporting is negatively and significantly impacted by board gender diversity, with a coefficient of -0.006 and a p-value of -0.014. The research disproves hypothesis 3, according to which profitability has no appreciable moderating influence on the association between board gender and integrated reporting of listed oil and gas companies in Nigeria. The research conducted by Agyemang et al. (2019) serves as a foundation for this investigation. Female directors were shown to significantly negatively impact integrated reporting of listed oil and gas businesses in Nigeria, according to the profitability moderator. As a result, oil and gas companies ought to employ fewer women as directors.

5. Conclusion and Recommendations

The moderating role of profitability in the link between board composition and integrated reporting of Nigerian oil and gas businesses was examined in this study. Board independence, gender diversity, and board size serve as proxies for board characteristics, whereas integrated reporting serves as a proxy for the dependent variable. The study is carried out between 2007 and 2021. As a result, the study draws the conclusion that profitability plays a determining role in the relationship between board size and integrated reporting and between board gender diversity and integrated reporting. This study suggests that oil and gas companies keep their boards at a minimum size of eight (8) members in order to lower operating expenses and boost profitability. Similar to this, oil and gas companies ought to have fewer female directors.

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APPENDIX A1

DATA FOR DERIVING IR

FC1	FC2	IC1	IC2	HC1	HC2	SC	MC1	MC2	NC
28.41	71.59	0	0	94	4.05	0.02	5.44	0.19	5.99
34.78	65.22	0	0	90	3.46	0.02	4.98	0.17	6.31
36.65	63.35	0	0	88	1.56	0	4.23	0.09	5.5
47.8	52.2	0	0	76	1.27	0.01	6.05	0.18	7.31
43.51	56.49	1.67	0	73	0.92	0.01	5.63	0.14	6.84
19.63	80.37	0.09	0	100	0.48	0.01	8.85	0.3	9.59
23.42	76.58	0	0	95	0.55	0.01	7.23	0.14	8
27.52	72.48	0	0	98	2.99	0.01	6.15	0.2	6.72
28.41	71.59	0	0	94	4.05	0.02	5.44	0.19	5.99
34.78	65.22	0	0	90	3.46	0.02	4.98	0.17	6.31
36.65	63.35	0	0	88	1.56	0	4.23	0.09	5.5
47.8	52.2	0	0	76	1.27	0.01	6.05	0.18	7.31
43.51	56.49	1.67	0	73	0.92	0.01	5.63	0.14	6.84
42.61	57.39	1.98	0	73	1.08	0	17.91	0.23	19.94
34.63	65.37	1.47	0	75	0	0	12.88	0.14	15.7
10.74	89.26	0	0.23	232	1.94	0	2.46	2.46	3.48
30.79	69.21	0	0.16	217	1.74	0	43.8	1.47	3.84
37.54	62.46	0	0.14	213	1.88	0	39.35	1.14	4.05
44.91	55.09	0	0.1	210	1.93	0	2.05	0.94	3.14
34.38	65.62	2.93	0.15	153	1.36	0.01	5.38	4.29	13.4
17.84	82.16	0	1.77	108	1.53	0	9.8	0.53	9.44
40.46	59.54	0	0.58	243	1.12	0	44.83	0.28	3.87
31.84	68.16	0	0.34	231	1.04	0.01	2.33	2.33	2.89
10.74	89.26	0	0.23	232	1.94	0	2.46	2.46	3.48
30.79	69.21	0	0.16	217	1.74	0	43.8	1.47	3.84
37.54	62.46	0	0.14	213	1.88	0	39.35	1.14	4.05
44.91	55.09	0	0.1	210	1.93	0	2.05	0.94	3.14
34.38	65.62	2.93	0.15	153	1.36	0.01	5.38	4.29	13.4
27.79	72.21	2.04	0.07	266	0.99	0.04	3.55	2.01	9.8
13.48	86.52	4.42	0.67	255	1.26	0	2.65	6.05	6.61
25.52	74.48	0	0.11	202	2.63	0	1.84	0.01	2.61
26.44	73.56	0	0.09	189	2.69	0	0.64	0	2.73
28.47	71.53	0	0.08	175	1.75	0	0.19	0.15	3.55
30.05	69.95	0	0.08	215	1.48	0	0.16	0.92	3.8
30.62	69.38	0	0.08	201	1.49	0.05	0.62	0.56	3.27
18.85	81.15	0	0.11	266	1.48	0	3.3	0.2	2.73
21.9	78.1	0	0.12	248	1.35	0	3.3	0.05	2.36
18.59	81.41	0	0.1	253	1.71	0	2.06	0.03	2.36
25.52	74.48	0	0.11	202	2.63	0	1.84	0.01	2.61
26.44	73.56	0	0.09	189	2.69	0	0.64	0	2.73

28.47	71.53	0	0.08	175	1.75	0	0.19	0.15	3.55
30.05	69.95	0	0.08	215	1.48	0	0.16	0.92	3.8
30.62	69.38	0	0.08	201	1.49	0.05	0.62	0.56	3.27
39.95	60.05	0	0.07	198	1.89	0.06	0.26	0.31	3.77
40.36	59.64	0	0.05	199	1.72	0.05	0.44	0	2.77
33.9	66.1	0	0.03	55	0.66	0	15.43	0.28	3.23
34.17	65.83	0	0.04	55	0.69	0	13.53	0.67	3.05
25.84	74.16	0	0.26	56	0.32	0.01	8.71	0.42	4.79
24.24	75.76	1.78	0.2	73	0.32	0	8.42	0.79	5.14
43.49	56.51	7.17	0.34	83	0.39	0	16.03	2.11	13.17
19.26	80.74	0	0	52	0.46	0	14.56	0.28	1.96
38.96	61.04	0	0	52	0.48	0	25.71	0.5	4.09
45.35	54.65	0	0.06	52	3.93	0.02	24.76	0.59	4.98
33.9	66.1	0	0.03	55	0.66	0	15.43	0.28	3.23
34.17	65.83	0	0.04	55	0.69	0	13.53	0.67	3.05
25.84	74.16	0	0.26	56	0.32	0.01	8.71	0.42	4.79
24.24	75.76	1.78	0.2	73	0.32	0	8.42	0.79	5.14
43.49	56.51	7.17	0.34	83	0.39	0	16.03	2.11	13.17
37.32	62.68	5.72	0.21	82	1.72	0.03	12.91	1.36	14.55
26.3	73.7	4.48	0.14	85	1.21	0.01	10.04	1.27	11.47
32.22	67.78	11.82	0.01	430	8.92	0	6.1	0.07	18.01
10.29	89.71	13.28	0	246	8.75	0	5.76	0.06	20.51
61.74	60.87	14.06	0	180	19.15	0	3.35	0.03	20.14
-100.62	200.62	14.09	0	218	33.58	0	2.45	0.01	21.49
-147.85	247.85	15.29	0	174	27.03	0	1.66	0.01	17.36
46.32	53.68	38.11	0.03	566	4.97	0	9.77	0.3	21.24
39.3	60.7	25.78	0.02	522	4.62	0	7.01	0.22	17.75
32.22	67.78	11.82	0.01	430	8.92	0	6.1	0.07	18.01
10.29	89.71	13.28	0	246	8.75	0	5.76	0.06	20.51
61.74	60.87	14.06	0	180	19.15	0	3.35	0.03	20.14
-100.62	200.62	14.09	0	218	33.58	0	2.45	0.01	21.49
-147.85	247.85	15.29	0	174	27.03	0	1.66	0.01	17.36
20.21	73.98	21.54	0	209	18.12	0	0.91	0	9.4
18.1	81.9	32.04	0	132	21.61	0	0.19	0.01	13.27
2.16	102.16	36.29	0	136	39.35	0	0.07	0	15.79
31.36	68.64	0	0	82	0.63	0.01	8.88	0.61	18.65
27.24	72.76	0	0.04	132	0.61	0	6.17	0.45	15.68
37.16	62.84	0	0.03	130	0.67	0.01	6.51	0.8	20.24
38.17	61.83	0	0.01	117	0.77	0	5.84	0.74	23.07
43.22	56.78	0	0.01	104	0.88	0	5.07	0.69	32.08
34.27	65.73	0	0.25	109	1.02	0	14.44	0.68	23.7
29.88	70.12	0	0.12	88	0.67	0	11.19	0.83	19.69
34.95	65.05	0	0.1	86	0.85	0	11.68	0.87	21.95
31.36	68.64	0	0	82	0.63	0.01	8.88	0.61	18.65
27.24	72.76	0	0.04	132	0.61	0	6.17	0.45	15.68

37.16	62.84	0	0.03	130	0.67	0.01	6.51	0.8	20.24
38.17	61.83	0	0.01	117	0.77	0	5.84	0.74	23.07
43.22	56.78	0	0.01	104	0.88	0	5.07	0.69	32.08
45.95	54.05	2.92	0	99	1.12	0	4.15	0.6	34.19
46.19	53.81	2.16	0	98	0.54	0	4.89	0.65	32.46
43.37	56.63	0	0	390	8.42	0.06	0.1	0.12	0.04
42.51	57.49	0	0	399	5.73	0.08	0.07	0.06	0.02
36.64	63.36	0	0	464	4.64	0.05	0.11	0.28	0.06
44.85	55.15	0.4	0	463	5.4	0.03	0.04	0.37	0.51
48.24	51.76	0.3	0	467	7.95	0.08	0.02	0.35	0.4
48.24	51.76	0.3	0	467	7.95	0.08	0.02	0.35	0.4
43.86	56.14	0.19	0	469	5.88	0.06	1.1	0.18	0.29
41.52	58.48	0	0	340	2.35	0.04	0.15	0.13	0.07
48.46	51.54	0	0	389	4.23	0.05	0.08	0.12	0.06
43.37	56.63	0	0	390	8.42	0.06	0.1	0.12	0.04
42.51	57.49	0	0	399	5.73	0.08	0.07	0.06	0.02
36.64	63.36	0	0	464	4.64	0.05	0.11	0.28	0.06
44.85	55.15	0.4	0	463	5.4	0.03	0.04	0.37	0.51
48.24	51.76	0.3	0	467	7.95	0.08	0.02	0.35	0.4
43.86	56.14	0.19	0	469	5.88	0.06	1.1	0.18	0.29
19.42	80.58	0	0.16	477	3.41	0.02	6.49	0.66	13.69
17.21	82.79	0	0.05	486	2.57	0.05	3.39	0.63	8.96
26.14	73.86	0	0.05	469	2.86	0.05	5.71	0.7	12.25
23.19	76.81	0	0.02	461	2.86	0.03	6.25	0.97	10.73
21.17	78.83	5.62	0.01	451	3.01	0.03	7.94	0.95	11.57
14.86	85.14	0	0.02	474	2.4	0	6.29	0.39	11.37
16.68	83.32	0	0.17	468	2.39	0.01	6.13	0.59	12.28
14.58	85.42	0	0.18	483	2.82	0.02	5.46	0.45	11.31
19.42	80.58	0	0.16	477	3.41	0.02	6.49	0.66	13.69
17.21	82.79	0	0.05	486	2.57	0.05	3.39	0.63	8.96
26.14	73.86	0	0.05	469	2.86	0.05	5.71	0.7	12.25
23.19	76.81	0	0.02	461	2.86	0.03	6.25	0.97	10.73
21.17	78.83	5.62	0.01	451	3.01	0.03	7.94	0.95	11.57
19.6	80.4	5.7	0.1	438	4.21	0.05	8.13	0.77	11.52
19.94	80.06	3.77	0.06	458	3.24	0.02	6.08	1.14	7.78

Source: Field work 6 – Capitals scoring index 2023

APPENDIX A2

RAW DATA

YEAR	PID	IR	BS	BIND	BGDT	BS PROFDUM	BIND PROFDUM	BGDT PROFDUM	PROF	PROFDUM
2007	1	0.0610582	6	50	16.67	6	50	16.67	13	1
2008	1	0.2712018	6	50	16.67	6	50	16.67	19.48	1
2009	1	0.3328923	8	62.5	0	8	62.5	0	18.02	1
2010	1	0.700726	7	71.43	0	7	71.43	0	19.44	1
2011	1	0.5592008	7	71.43	0	7	71.43	0	14.71	1
2012	1	0.2285903	6	66.67	16.67	6	66.67	16.67	13.04	1
2013	1	0.1035598	6	66.67	16.67	6	66.67	16.67	12.95	1
2014	1	0.0316975	6	66.67	16.67	6	66.67	16.67	17.53	1
2015	1	0.0610582	6	50	16.67	6	50	16.67	13	1
2016	1	0.2712018	6	50	16.67	6	50	16.67	19.48	1
2017	1	0.3328923	8	62.5	0	8	62.5	0	18.02	1
2018	1	0.700726	7	71.43	0	7	71.43	0	19.44	1
2019	1	0.5592008	7	71.43	0	7	71.43	0	14.71	1
2020	1	0.5295101	7	71.43	0	7	71.43	0	6.64	1
2021	1	0.2662533	6	83.33	0	6	83.33	0	8.28	1
2007	2	0.5218676	10	40	10	10	40	10	9.99	1
2008	2	0.1395733	10	40	10	10	40	10	8.18	1
2009	2	0.362253	8	75	12.5	8	75	12.5	11.11	1
2010	2	0.6053861	8	75	25	8	75	25	2.68	1
2011	2	0.2580059	6	66.67	0	6	66.67	0	20.16	1
2012	2	0.2876416	9	55.56	22.22	9	55.56	22.22	7.05	1
2013	2	0.4585826	9	66.67	11.11	9	66.67	11.11	8.03	1
2014	2	0.1742124	9	55.56	11.11	9	55.56	11.11	7.34	1
2015	2	0.5218676	10	40	10	10	40	10	9.99	1
2016	2	0.1395733	10	40	10	10	40	10	8.18	1

2017	2	0.362253	8	75	12.5	8	75	12.5	11.11	1
2018	2	0.6053861	8	75	25	8	75	25	2.68	1
2019	2	0.2580059	6	66.67	0	6	66.67	0	20.16	1
2020	2	0.0406046	6	66.67	16.67	6	66.67	16.67	6.8	1
2021	2	0.4314763	6	50	33.33	6	50	33.33	0.51	1
2007	3	0.0342817	11	54.55	0	11	54.55	0	10.39	1
2008	3	0.0039313	14	50	0	14	50	0	8.66	1
2009	3	0.0630376	13	61.54	7.69	13	61.54	7.69	7.07	1
2010	3	0.1151611	13	61.54	7.69	13	61.54	7.69	6.69	1
2011	3	0.1339651	11	72.73	9.09	11	72.73	9.09	6.21	1
2012	3	0.2543222	10	40	10	10	40	10	6.4	1
2013	3	0.153704	10	40	10	10	40	10	8.29	1
2014	3	0.2628995	10	50	0	10	50	0	4.43	1
2015	3	0.0342817	11	54.55	0	11	54.55	0	10.39	1
2016	3	0.0039313	14	50	0	14	50	0	8.66	1
2017	3	0.0630376	13	61.54	7.69	13	61.54	7.69	7.07	1
2018	3	0.1151611	13	61.54	7.69	13	61.54	7.69	6.69	1
2019	3	0.1339651	11	72.73	9.09	11	72.73	9.09	6.21	1
2020	3	0.4417579	10	70	10	10	70	10	5.83	1
2021	3	0.4552836	10	90	10	10	90	10	8.5	1
2007	4	0.2421709	4	75	25	4	75	25	6.44	1
2008	4	0.2510781	8	62.5	25	8	62.5	25	18.72	1
2009	4	0.023725	8	75	25	8	75	25	6.97	1
2010	4	0.0765084	8	75	25	8	75	25	5.38	1
2011	4	0.5585409	8	75	25	8	75	25	6.3	1
2012	4	0.2407964	5	80	0	5	80	0	5.8	1
2013	4	0.4090982	5	80	0	5	80	0	9.94	1

2014	4	0.6199016	5	60	20	5	60	20	6.3	1
2015	4	0.2421709	4	75	25	4	75	25	6.44	1
2016	4	0.2510781	8	62.5	25	8	62.5	25	18.72	1
2017	4	0.023725	8	75	25	8	75	25	6.97	1
2018	4	0.0765084	8	75	25	8	75	25	5.38	1
2019	4	0.5585409	8	75	25	8	75	25	6.3	1
2020	4	0.3549953	10	70	20	10	70	20	4.37	1
2021	4	0.0085498	9	77.78	22.22	9	77.78	22.22	0.53	1
2007	5	0.1867485	10	50	0	10	50	0	2.32	1
2008	5	0.5367129	6	50	16.67	0	0	0	-11.93	0
2009	5	0.4147079	6	50	16.67	0	0	0	-52.18	0
2010	5	4.195587	5	60	20	0	0	0	-30.26	0
2011	5	5.753684	9	77.78	11.11	0	0	0	-14.2	0
2012	5	0.6519015	10	50	0	0	0	0	-11.16	0
2013	5	0.4203147	10	50	0	10	50	0	5.34	1
2014	5	0.1867485	10	50	0	10	50	0	2.32	1
2015	5	0.5367129	6	50	16.67	0	0	0	-11.93	0
2016	5	0.4147079	6	50	16.67	0	0	0	-52.18	0
2017	5	4.195587	5	60	20	0	0	0	-30.26	0
2018	5	5.753684	9	77.78	11.11	0	0	0	-14.2	0
2019	5	0.0177872	7	57.14	14.29	7	57.14	14.29	193.2	1
2020	5	0.2790642	7	57.14	14.29	0	0	0	-5.26	0
2021	5	0.9474326	7	57.14	14.29	0	0	0	-20.94	0
2007	6	0.1583774	8	75	12.5	8	75	12.5	4.99	1
2008	6	0.0224604	8	75	12.5	8	75	12.5	4.82	1
2009	6	0.3497169	9	88.89	11.11	9	88.89	11.11	18.03	1
2010	6	0.3830364	10	90	30	0	0	0	-2.23	0

2011	6	0.5496337	8	87.5	25	8	87.5	25	0.95	1
2012	6	0.2543771	8	62.5	12.5	8	62.5	12.5	2.81	1
2013	6	0.1095528	8	62.5	12.5	8	62.5	12.5	5.95	1
2014	6	0.27681	7	57.14	14.29	7	57.14	14.29	4.2	1
2015	6	0.1583774	8	75	12.5	8	75	12.5	4.99	1
2016	6	0.0224604	8	75	12.5	8	75	12.5	4.82	1
2017	6	0.3497169	9	88.89	11.11	9	88.89	11.11	18.03	1
2018	6	0.3830364	10	90	30	0	0	0	-2.23	0
2019	6	0.5496337	8	87.5	25	8	87.5	25	0.95	1
2020	6	0.6396953	7	85.71	28.57	0	0	0	-4.26	0
2021	6	0.6476128	7	85.71	28.57	7	85.71	28.57	1.89	1
2007	7	0.5545822	12	66.67	8.33	0	0	0	-4.39	0
2008	7	0.5262112	11	81.82	0	11	81.82	0	4.47	1
2009	7	0.3325624	12	75	0	12	75	0	12.62	1
2010	7	0.6034068	12	75	8.33	12	75	8.33	9.98	1
2011	7	0.7152414	13	76.92	15.38	0	0	0	-0.83	0
2012	7	0.7152414	13	76.92	15.38	0	0	0	-0.83	0
2013	7	0.5707471	13	69.23	15.38	13	69.23	15.38	6.32	1
2014	7	0.4935515	12	66.67	8.33	12	66.67	8.33	10.9	1
2015	7	0.7224991	12	66.67	8.33	12	66.67	8.33	6.2	1
2016	7	0.5545822	12	66.67	8.33	0	0	0	-4.39	0
2017	7	0.5262112	11	81.82	0	11	81.82	0	4.47	1
2018	7	0.3325624	12	75	0	12	75	0	12.62	1
2019	7	0.6034068	12	75	8.33	12	75	8.33	9.98	1
2020	7	0.7152414	13	76.92	15.38	0	0	0	-0.83	0

2021	7	0.5707471	13	69.23	15.38	13	69.23	15.38	6.32	1
2007	8	0.2355181	11	63.64	18.18	11	63.64	18.18	9.91	1
2008	8	0.3084251	9	55.56	11.11	9	55.56	11.11	15.49	1
2009	8	0.0138282	9	77.78	22.22	9	77.78	22.22	13.76	1
2010	8	0.1111474	9	77.78	11.11	9	77.78	11.11	12.5	1
2011	8	0.1777864	9	77.78	33.33	9	77.78	33.33	8.2	1
2012	8	0.3859506	10	80	10	10	80	10	11.4	1
2013	8	0.3259096	10	70	10	10	70	10	12.72	1
2014	8	0.3951877	11	63.64	18.18	11	63.64	18.18	8.56	1
2015	8	0.2355181	11	63.64	18.18	11	63.64	18.18	9.91	1
2016	8	0.3084251	9	55.56	11.11	9	55.56	11.11	15.49	1
2017	8	0.0138282	9	77.78	22.22	9	77.78	22.22	13.76	1
2018	8	0.1111474	9	77.78	11.11	9	77.78	11.11	12.5	1
2019	8	0.1777864	9	77.78	33.33	9	77.78	33.33	8.2	1
2020	8	0.22958	9	77.78	33.33	9	77.78	33.33	4.04	1
2021	8	0.2183635	8	75	37.5	8	75	37.5	12.75	1

Source: Raw data from listed oil and gas companies in Nigeria 2023

APPENDIX B1

DESCRIPTIVE STATISTICS

```
. asdoc sum IR BS BIND BGDT BSPROFDUM BINDPROFDUM BGDTPROFDUM
```

Variable	Obs	Mean	Std. Dev.	Min	Max
IR	120	.4792803	.8765637	.0039313	5.753684
BS	120	8.858333	2.352527	4	14
BIND	120	67.00958	12.61722	40	90
BGDT	120	13.37917	9.506811	0	37.5
BSPROFDUM	120	7.475	3.858773	0	14
BINDPROFDUM	120	56.42917	27.06244	0	90
BGDTPROFDUM	120	10.80542	10.12239	0	37.5

APPENDIX B2

HETEROSKEDASTICITY TEST RESULTS FOR MODEL 1

```
. asdoc imtest
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	5.75	9	0.7642
Skewness	5.52	3	0.1376
Kurtosis	3.33	1	0.0679
Total	14.61	13	0.3325

HETEROSKEDASTICITY TEST RESULTS FOR MODEL 2

```
. asdoc imtest
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	25.60	9	0.0024
Skewness	19.57	3	0.0002
Kurtosis	3.02	1	0.0820
Total	48.20	13	0.0000