INTERNAL CORPORATE GOVERNANCE AND INTELLECTUAL CAPITAL OF LISTED OIL AND GAS FIRMS IN NIGERIA

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ABSTRACT: *Purpose: In view of the need to gain a greater knowledge of internal corporate governance mechanisms and their associated influences, this paper interrogates the impact of internal corporate governance instruments on intellectual capital for eight quoted oil and gas firms. Design/Methodology/Approach: Internal corporate governance mechanisms were represented by board size, independence, gender, share ownership, audit committee size, institutional ownership, government ownership, family ownership and foreign ownership. Intellectual capital was represented by value added intellectual capital score disaggregated into capital employed efficiency, human capital efficiency and structural capital efficiency. The impact of internal corporate governance mechanisms on intellectual capital was interrogated over 13-year period (2007-2019) using panel regression technique. Findings: The findings provide clear evidence that internal corporate governance influences intellectual capital performance of oil and gas firms. Board size, independence of directors, women on the board, family ownership and foreign ownership are seen to have no significant impact. However, share ownership, audit committee size, institutional ownership and government ownership show significant impact. Implications/Originality/value: The findings of this study are important because they provide strong empirical evidence for corporate stakeholders to strictly monitor the internal corporate governance mechanisms and intellectual capital score of oil and gas firms. This also serves as one of the few empirical studies in Nigeria.*

KEYWORDS: audit committee size, government ownership, institutional ownership, share ownership, capital employed efficiency.

INTRODUCTION

Intellectual capital has become a force to reckon with in the past few years as a response to the asymmetric corporate business environment occasioned by the global financial and economic crisis. It has become far more important than the traditional factors of production, namely; land, capital and labour. Intellectual capital has become part of corporate success stories, particularly in the knowledge-based business climes. Thus, employing intellectual capital has become a strategic tool for creating successful businesses. However, it is important to note that the quality or performance of intellectual capital of a firm depends largely on a number of factors. Among these determinants are firm's own internal governance mechanisms, such as audit committee size, board size, board independence, board gender diversity, board family ownership, board foreign ownership, board share ownership, board institutional ownership and board government ownership.

A firm inner governance instruments have capacity to enhance intellectual capital value and deliver stakeholders' interests. It could ensure the maximization of shareholders' wealth through effective and efficient management and deployment of intellectual capital of the firm. It is suggestive that internal corporate governance mechanisms would influence the use and management of a firm's intellectual capital, which in turn could influence financial performance. However, very little empirical evidence is available about what effects internal corporate governance instruments have on intellectual capital performance in Nigeria. This is particularly of concern given that the oil and gas sector is the dominant sector driving the Nigerian economy. In view of this lacuna, we investigate the impact of internal corporate governance mechanisms on intellectual capital oil and gas firms in Nigeria. Internal corporate governance mechanisms are about the quality of the board of directors and firm's audit committee, so in this study, they are measured using nine internal mechanisms (audit committee size, board size, independence, gender diversity, family ownership, foreign ownership, share ownership, institutional ownership and government ownership.

The subject of this study is the quoted oil and gas firms for the obvious dominant role the sector plays as major foreign exchange earner for the country. Secondly, the sector is dominated by firms with strong corporate governance history and early employer of intellectual capital in Nigeria given years of partnerships and affiliations with foreign oil and gas companies. This study is important for several reasons; while Nigeria is ranked 22nd overall global economy, it is recently been touted as the global capital of poverty replacing India. Also, Nigeria is witnessing financial asymmetries due to past mismanagement of the economy compounded by the current pandemic (COVID-19). As a result, some firms are faced with difficulties in achieving their goals. We believe that intellectual capital when properly deployed could make a significant difference in the race to restore the lost economic past and prevent the country from becoming a failed state with attendant consequences.

The next section is literature review and hypotheses development. The section discusses the key concepts of interest, which are internal corporate governance mechanisms and intellectual capital. The section also reviews relevant empirical studies, discusses underlying theories and develops statements of hypotheses.

LITERATURE REVIEW AND HYPOTHESES

According to the Nigerian Securities and Exchange Commission Code of Corporate Governance (2008), which was made mandatory for all listed firms in 2014, it is the responsibility of the board of directors to set strategic goals and ensure that firm's resources (human, financial) are efficiently and effectively used in attaining those goals. From this Code, it is clear that corporate governance is seen to have influence on firm's intellectual capital. The Code defines corporate governance as measures designed to facilitate sound corporate practices and behavior. For the purpose of this study, 9 internal corporate mechanisms are of interest, namely; audit committee size, board size, board independence, board gender diversity, board family ownership, board foreign ownership, board share ownership, board institutional ownership and board government ownership.

Intellectual capital is the sum of intangible assets of the firm that contributes to the firm's financial performance. These intangible assets could include goodwill, patent rights, technologies, organizational structures, employees' expertise, organizational processes and systems, people, government favours, competitive advantages and sum of knowledge, skills and attitudes of employees. Intellectual capital is categorized into three (capital employed, human capital and structural capital). Capital employed includes the system, structure, operational process and organizational culture. Human capital consists of personal ability, knowledge, skills, attitudes and experience of firm's employees. Structural capital essentially consists of organization's own infrastructures, which assist human capital to function efficiently and effectively. Examples include data base, telecommunication technology, library, technical know-how and training facilities.

Three theories support firm's inner governance mechanisms; they are agency cost theory, stakeholders' theory and resource dependency theory. While the agency theory suggests that shareholders own the firm, the board and management have control over operations (Berle & Means, 1932); the stakeholders' theory suggests that firms do not only are responsible for its shareholders, but also have greater responsibilities toward the society. However, the resource dependency theory suggests that firms rely heavily on each other to survival and thrive. Given these three theories, this study adopts the agency cost theory since it is actually the board of directors and management and not the shareholders that can transform firm's intellectual capital into efficient and effective intangible assets towards attaining firm's goals. The conceptual framework is reported in Figure 1.

Independent variables

- Board Size
- Independence
- Gender
- Share Ownership
- Audit Committee Size
- Institutional Ownership
- Government Ownership
- Family Ownership
- Foreign Ownership

Dependent variables

- VAIC Score
- Capital Employed Efficiency
- Human Capital Efficiency
- Structural Capital Efficiency

Fig 1: Nexus between internal corporate governance mechanisms and intellectual capital.

Board size is the number of directors on the board and it has been found to affect firm's intellectual capital performance. Abeysekera (2010) examines the effect of board size on firm's intellectual capital. Data was collected from the top 26 out of 52 firms ranked at the Nairobi Stock Exchange (2002-2003). Findings show positive association between firms disclosing more intellectual capital and larger boards. Oba et al. (2013) investigate the impact of board size on intellectual capital and reveal that board size positively influences intellectual capital quality. Kamath (2019) examines the influence of corporate governance on intellectual capital using 95 listed firms on the National Stock Exchange in India over a 7-year period (2011–2017, using panel regression. Board size was found to negatively associate with intellectual capital performance. Given these results, this paper hypothesizes that:

H₁: Board size and intellectual capital do not have significant association.

Board of directors consists of executive and non-executive directors. Executive directors are involved in day to day operations. However, independent directors are not involved in daily running of the organization. Agency cost theory assumes conflict of interest between management and shareholders and therefore, there should be more non-executive directors in order to provide effective supervision. Al-Musallia and Ismail (2012) examine the influence of board of directors on intellectual asset using data set from 147 banks in the Gulf Cooperation Council countries over a period of three years (2008-2010). Findings indicate that the number of independent directors has a significant negative relationship with intellectual capital performance of GCC listed bank. Mahmudi and Nurhayati (2014) investigate the influence of board governance characteristics on intellectual capital performance. Intellectual capital performance was measured with the VAIC method. This research was conducted on the banking companies listed on the Stock Exchange from the year 2008-2012 using a sample of 31 firms. The results show that board independence has significant effect on intellectual capital performance. Kamath (2019) also found independence of directors to have significant impact on intellectual capital performance. Accordingly, this study predicts that:

H₂: Independence of the board has no significant effect on intellectual capital.

Female directors can create management elasticity and balance, which can direct board's focus on improving firm's intellectual capital. Williams (2001) and van der Zahn (2004) argue that women directors have positive impact on value added intellectual asset. Komalaa and Fuad (2017) investigate the effect of board diversities on intellectual capital performance using data from knowledge-intensive companies from 2012-2015; gender diversity was found to affect the intellectual capital performance significantly negatively. Using a sample of 59 Islamic banks during the period of 2006-2017, Saruchi et al. (2019) assess the effect of corporate governance on intellectual capital of Islamic banks and conclude that women directors have significant positive impact on intellectual capital. Given these contradictory arguments, the study predicts that:

H₃: Gender diversity and intellectual capital have no significant relationship.

Jensen and Meckling (1976) propounded the convergence-of-interest theory, which suggest that directors and managers have enlightened self-interest to invest in intellectual capital of the firm. Saruchi et al. (2019) argue that shareholding directors will want to improve the bottom-line by positively influencing employees' intellectual ability. Komalaa and Faud (2017) conclude that directors representing core interest have sufficient reason to ensure that the intellectual capital of the firm is enhanced. Majority shareholders have reasons to ensure that the firm's employees are well trained and developed and thus enhance intellectual asset (Mahmudi & Nurhayati, 2014). Bohdanowicz and Urbanek (2013) examine the association between ownership structure and intellectual capital. Data was extracted from Polish companies listed on the Warsaw Stock Exchange. Ownership held by management board members was found to negatively affect intellectual capital and structural capital efficiency. Al-Sartawi (2018) investigates the influence of ownership structure on intellectual capital. Data was collected from

GCC listed firms and concludes that there is a significant negative relationship between director's ownership and intellectual capital. On the basis of these arguments, this study predicts that:

H4: Share ownership has no significant effect on intellectual capital.

Audit committee is in charge of overseeing financial reporting quality. Audit committee size has been reported to influence firm's intellectual capital. For example, audit committee size was found to have significant impact on intellectual capital performance (Mahmudi & Nurhayati, 2014). However, Naimah and Mukti (2019) examine the impact of audit committee size on intellectual capital disclosure using the LQ45-quoted firms on the Indonesian Stock Exchange (BEI) with data set between 2013 and 2014. The result shows that size of audit committee does not significantly influence intellectual capital. Therefore, the following hypothesis is proposed.

H5: Audit committee size has no significant effect on intellectual capital.

Finance institutions such as mutual funds, pension funds, hedge funds and private equity firms have large sums of money usually at their disposal. Hence, their investment in equity is traditionally received with open hands. Very often, their interests are in alignment with other shareholders to maximize shareholders' wealth. Institutional ownership has been found to influence firm's intellectual capital performance. For example, Shahveisi et al. (2017) study the effects of ownership structure on intellectual capital performance and its components in the companies listed in Tehran Stock Exchange and show that there is a significant positive relationship between board institutional ownership and intellectual capital performance. However, Al-Sartawi (2018) also concluded that there is a significant negative relationship between institutional ownership and intellectual capital. Mukti and Istianingsih (2018) examine the impact of ownership structure on intellectual capital disclosure of all public companies listed on the Indonesian Stock Exchange (2004-2008) and found that institutional ownership has positive effect on intellectual capital. In view of these results, the following hypothesis is proposed:

H6: Institutional ownership has no significant effect on intellectual capital.

Government corporate ownership is particularly important in developing countries because of poor private equity capital base. This was the scenario in Nigeria post-independence in 1960 until the 4th Republic in 1999 when government divested and sold public enterprises to the private sector. Government ownership has been found to be related to intellectual capital. For example, Al-Sartawi (2018) investigates the relationship between ownership structure and intellectual capital in GCC listed firms and concluded that government ownership has significant negative effect on intellectual capital. Similarly, Kweh et al. (2019) analyse the impact of intellectual capital on government ownership. Data was collected from the top 200 companies quoted on the Malaysian Stock Exchange over the period 2010 to 2015. The OLS results indicate that government ownership has significant negative impact on capital employed. In view of these empirical evidences, the paper hypothesizes that:

H7: Government ownership has no significant effect on intellectual capital.

Family ownership and control has always been an important consideration in corporate management. This is because a considerable number of corporations were founded by families and their shares are represented by families on the board. Saleh et al. (2009) examine whether ownership structure can explain the variation in a company's intellectual capital performance. The study uses VAIC to measure intellectual capital performance. Data was extracted from all-companies quoted on the Malaysian Exchange of Securities Dealing and Automated Quotation Market (2005-2007). The results show that family ownership shows a negative effect on intellectual capital. Mukti and Istianingsih (2018) also found that family ownership did not affect intellectual capital. Furthermore, Nassar et al. (2018) interrogate the impact of ownership structure on intellectual capital. Data was obtained from quoted firms on Borsa Istanbul over 2005-2015. Results show that family ownership has a significant negative impact on intellectual capital. The paper, therefore, states that:

H8: Family ownership has no significant effect on intellectual capital.

Foreign ownership refers to shareholdings by individuals who are not citizens of that country or by firms whose headquarters are outside that country. It has been accepted that a strong and robust foreign ownership significantly affects firm's intellectual capital performance. For example, Bohdanowicz and Urbanek (2013) found negative relationship between ownership by foreign investors and capital employed efficiency. Al-Sartawi (2018) also concluded that there is a significant negative relationship between foreign ownership and intellectual capital. In addition, Nassar et al. (2018) found that foreign ownership structure has a significant negative impact on intellectual capital efficiency. Given these findings, we state that:

H9: Foreign ownership and intellectual capital have no significant association.

METHODOLOGY

Data for this paper was obtained from MACHAMERATIOS® covering quoted oil and gas companies in Nigeria. While there are 12 listed oil and gas firms in Nigeria as at 31st December, 2019, this study deleted 4 firms which are on technical suspension by the Nigerian Stock Exchange. Thus, the 8 remaining firms were included in the study. Correlational research design was adopted since it examines cause and effect relationships. Data were collected from the annual reports and accounts of the sampled firms over a 13-year period (2007-2019). The data were diagnosed with Chen-Shapiro test for normal data, Pearson product moment correlation analysis, variance inflation factor and tolerance level for multicollinearity, Cameroon & Trivedi test for heteroskedasticity, Breusch/Pagan Lagrangian Multiplier test for panel effect/Ordinary Least Squares and Hausman Specification test for random effect model/fixed effect model. Descriptive and inferential analyses were conducted on the data and the test results were interpreted at 5 per cent level of significance. The empirical models for the study are as follows:

$$vaic_{i,t} = \alpha + \beta_1 acs_{i,t} + \beta_2 bs_{i,t} + \beta_3 bfao_{i,t} + \beta_4 bfoo_{i,t} + \beta_5 bgd_{i,t} + \beta_6 bgo_{i,t} + \beta_7 bind_{i,t} + \beta_8 bio_{i,t} + \beta_9 bso_{i,t} + \varepsilon_{i,t}$$
(1)

$$cee_{i,t} = \alpha + \beta_1 acs_{i,t} + \beta_2 bs_{i,t} + \beta_3 bfao_{i,t} + \beta_4 bfoo_{i,t} + \beta_5 bgd_{i,t} + \beta_6 bgo_{i,t} + \beta_7 bind_{i,t} + \beta_8 bio_{i,t} + \beta_9 bso_{i,t} + \varepsilon_{i,t}$$
(2)

$$hce_{i,t} = \alpha + \beta_1 acs_{i,t} + \beta_2 bs_{i,t} + \beta_3 bfao_{i,t} + \beta_4 bfoo_{i,t} + \beta_5 bgd_{i,t} + \beta_6 bgo_{i,t} + \beta_7 bind_{i,t} + \beta_8 bio_{i,t} + \beta_9 bso_{i,t} + \varepsilon_{i,t}$$
(3)

$$sce_{i,t} = \alpha + \beta_1 acs_{i,t} + \beta_2 bs_{i,t} + \beta_3 bfao_{i,t} + \beta_4 bfoo_{i,t} + \beta_5 bgd_{i,t} + \beta_6 bgo_{i,t} + \beta_7 bind_{i,t} + \beta_8 bio_{i,t} + \beta_9 bso_{i,t} + \varepsilon_{i,t}$$
(4)

Whereas:

vaic = Intellectual capital, measured by value added intellectual capital score, which sums up the values of cee, hce and sce (Orugun & Aduku, 2017; Yahaya, 2019).

cee = Capital employed efficiency, measured by asset turnover (net sales/total assets) (Yahaya, 2019)

hce = Human capital efficiency, measured by the total number of employees (Yahaya, 2019)

sce = Structural capital efficiency, measured by the expenses of research and development (Yahaya, 2019)

acs = Audit committee size, measured by the number of members in the audit committee (Dauda et al., 2018; Odudu et al., 2018; Onyabe et al., 2018; Salawu et al., 2018).

bs = Board size, measured by the number of board members (Abdulganigu & Olatoro, 2018; Andrew et al., 2018; Musyoka, 2015; Olabisi et al., 2018).

bfao = Board family ownership, measured by the percentage of shares held by family members in the board of directors (Maseda et al., 2019; Odudu et al., 2019).

bfoo = Board foreign ownership, measured by the percentage of foreigners on the board (Andow, 2018; Odudu et al., 2019).

bgd = Board gender, measured by the number of female directors (Andrew et al., 2018; Firoozi et al., 2016; Musyoka, 2015; Solanke et al., 2018).

bgo = Board government ownership, measured by the board members appointed by government (Tariq, 2016; Tran et al., 2014).

bind = Board independence, measured by the proportion of outside directors (Abdulganigu & Olatoro, 2018; Andrew et al., 2018; Mohammed et al., 2018; Musyoka, 2015; Olabisi et al., 2018).

bio = Board institutional ownership, measured by the number of board members representing corporate shareholders (Sakawa & Watanabel, 2019; Tariq, 2016).

bso = Board share ownership, measured by the number of shares held by board members (Galal & Soliman, 2017).

α = Constant

i = Firm script (In this case, i = 8 firms)

t = Time script (In this case, t = 13 years)

ε = Idiosyncratic error

Note that vaic, cee, hce and sce are the four constructs of intellectual capital performance and acs, bs, bfao, bfoo, bgd, bgo, bind, bio and bso are the 9 instruments of internal corporate governance mechanisms used in this study. The next section, which is empirical results, presents, interprets, discusses and tests the hypotheses of the study.

EMPIRICAL RESULTS AND DISCUSSION

In this section, the results were reported and discussed. The summary descriptive statistics were reported in Table 1. In addition, the study tested whether the models fit for OLS, FEM or REM. The

Breusch/Pagan Lagrangrian Multiplier Test results in Table 8 demonstrate the accuracy of applying OLS to the models, meaning that the panel effects on the models are not significant.

Table 1
Results of Descriptive Analysis

Variables of Interest	No. of Observation	Mean	Standard Deviation	Minimum Mean	Maximum Mean
vaic	104	7.940	4.768	-2.85	37.07
cee	104	.215	.130	-.04	.66
hce	104	6.887	4.718	-4.06	35.72
sce	104	.837	.184	.22	1.89
Bs	103	9.010	2.713	4	16
bind	103	60.012	17.139	0	90
bgd	103	8.963	7.809	0	30
bso	104	12.489	19.786	0	78.2
acs	102	5.824	.789	4	8
bio	102	50.392	23.524	0	75
bgo	102	.196	1.393	0	10
bfao	102	2.833	7.130	0	33
bfoo	95	.505	.503	0	1

Source: Authors' Computations using STATA 13

As shown in Table 1, the minimum number of observations is 95, which is greater than 20 considered adequate to represent the distribution of statistical data for analysis. The mean which is the standard measure of the centre of the distribution of the data ranges between 0.196 and 60.012. Also, the standard deviation, which determines how spread out the data are from the mean are all less than the mean values of all the variables of the study. A lesser standard deviation value indicates lesser spread in the data. The results of diagnostic checks and post estimation tests are presented in Tables 2 to 7. Table 2 presents the results of Chen-Shapiro test for normal data.

Table 2
Results of Chen-Shapiro test for normality

Variables of Interest	No. of Observations	QH	QH*	P>z
Vaic	104	0.902	1.000	< 0.0001
Cee	104	0.992	0.077	0.005
Hce	104	0.900	1.021	< 0.0001
Sce	104	0.832	1.710	< 0.0001
Bs	103	1.001	-0.005	0.101
Bind	103	1.037	-0.372	> 0.200
Bgd	103	0.920	0.813	< 0.0001
Bso	104	0.828	1.752	< 0.0001
Acs	102	0.979	0.216	< 0.0001
Bio	102	0.927	0.742	< 0.0001
Bgo	102	0.282	7.257	< 0.0001
Bfao	102	0.625	3.793	< 0.0001
Bfoo	95	0.652	3.392	< 0.0001

Source: Authors' Computations using STATA 13

As shown in Table 2, the p-values of the variables except board size (*bs*) and board independence (*bind*) are significant (<.05) confirming that the residual is not normally distributed. These results imply that the heteroskedasticity test to be used in the study will be the Cameron & Trivedi's Imtest. In order to test the *a priori* expectations of the study, correlation coefficients were computed (see results in Table 3).

Table 3
Correlation Metrics

	vaic	Cee	hce	sce	bs	bind	bgd	bso	acs	bio	bgo	bfao	bfoo
vaic	1.000												
cee	.174	1.000											
	.077												
hce	.999*	.159	1.000										
	.000	.107											
sce	.168	- .26*	.138	1.000									
	.881	.007	.162										
bs	.024	.097	.021	.020	1.000								
	.807	.331	.831	.838									
bind	- .16	.040	- .151	- .301*	-.146	1.000							
	.107	.688	.127	.002	.142								
bgd	.159	.053	.151	.223*	-.101	-.079	1.000						
	.107	.599	.127	.0234	.311	.430							
bso	.072	- .291*	.079	.034	-.147	.126	.226*	1.000					
	.467	.003	.423	.732	.138	.206	.0214						
acs	.159	.107	.151	.187	.444*	-.120	.008	-.015	1.000				
	.110	.286	.130	.060	.000	.230	.935	.881					
bio	.146	.329*	.146	- .212*	-.049	.271*	.161	.161	.126	1.000			
	.145	.001	.142	.0324	.626	.006	.106	.106	.209				
bgo	.163	- .125	.165	.065	-.051	.127	.063	.338*	.034	.119	1.000		
	.102	.211	.097	.519	.608	.204	.530	.001	.734	.236			
bfao	-.133	- .253*	-.125	-.056	-.020	-.084	-.149	.145	.011	- .263*	-.057	1.000	
	.183	.0103	.210	.577	.845	.399	.134	.147	.910	.008	.573		
bfoo	.019	.294*	.021	- .228*	- .448*	.321*	.239*	-.031	- .306*	.461*	.145	- .405*	1.000
	.852	.004	.844	.026	.000	.0015	.0199	.763	.0026	.000	.161	.000	

Source: Authors' Computations using STATA 13

As shown in Table 3, seven out of the nine independent variables show positive relationships with intellectual capital management, measured by *vaic* in line with *a priori* expectations. However, board independence and board family ownership show negative relationships, which is outside the *a priori* expectations. These results may be explained by the fact that boards with greater outside directors may not have the motivation to investment in human capital since they do not have direct responsibility over the running of the firm. Also, board family members may be more interested in the earnings accruing as dividend; they may not support greater investment in human capital. Also, in order to test for the presence

or otherwise of multicollinearity among the independent variables, VIF and tolerance level were estimated (see Table 4).

Table 4
Multicollinearity Test Results

Variable	VIF	Tolerance Level
acs	1.36	0.734
bs	1.55	0.647
bfao	1.29	0.776
bfoo	2.24	0.446
bgd	1.24	0.807
bgo	1.21	0.825
bind	1.34	0.748
bio	1.46	0.685
bso	1.37	0.728
Mean VIF	1.45	

Source: Authors' Computations using STATA 13

As shown in Table 4, the VIFs for all the variables are less than 4, implying the absence of multicollinearity in the data sets. In order to estimate the presence or otherwise of heteroskedasticity in the models, Cameron and Trivedi's Imtest was carried out and the results are reported in Table 5.

Table 5
Cameron & Trivedi's Decomposition of IM-test for Heteroskedasticity Results

Source	vaic			cee			hce			sce		
	Chi^2	df	p	Chi^2	df	p	Chi^2	df	p	Chi^2	df	p
Heteroskedasticity	47.43	43	.286	58.15	43	.061	48.28	43	0.268	72.84	43	.003
Skewness	11.75	9	.228	8.72	9	.463	11.54	9	0.241	27.93	9	.001
Kurtosis	1.29	1	.256	3.23	1	.072	1.32	1	0.251	3.71	1	.054
Total	60.76	53	.216	70.10	53	.057	61.13	53	.207	104.5	53	.000

Source: Authors' Computations using STATA 13

As shown in Table 5, the p-values of models *vaic, cee* and *hce* are all greater than .05, which imply that there are no heteroskedasticity in them. However, model *sce* shows a p-value that is significant, which implies that the model has heteroskedasticity problem and requires robust regression. Furthermore, there is need to test for the significance of panel effects in the models.

Table 6
Results of Breusch/Pagan Lagrangrian Multiplier Test

	vaic	cee	hce	sce
$Chibar^2(01)$	0.00	0.00	0.00	0.00
$Prob > Chibar^2$	1.000	1.000	1.000	1.000

Source: Authors' Computations using STATA 13

As shown in Table 6, the Prob > Chibar^2 for the four constructs are not significant. These results imply that there is no panel effect on the models and therefore, it is more appropriate to pool the data sets together by ignoring both the panel and time scripts and run OLS regression. The results of the OLS regressions are reported in Tables 7 to 10.

Table 7
OLS Regression of vaic Model

vaic	Coef.	Std. Err.	t	P>t
bs	-.119	.298	-0.40	0.690
bind	-.044	.039	-1.13	0.261
bgd	.109	.083	1.32	0.190
bso	-.001	.025	-0.04	0.965
acs	.679	.742	0.91	0.363
bio	.030	.018	1.72	0.088
bgo	.516	.104	4.98	0.000
bfao	-.071	.039	-1.79	0.077
bfoo	-1.008	.943	-1.07	0.288
_cons	5.965	3.892	1.53	0.129
Prob > F = 0.000				
R-squared = 0.136				

Source: Authors' Computations using STATA 13

Table 7 reports the results of the *vaic* model and show that that internal corporate governance has significant effect on intellectual capital performance (Prob > F = 0.000). Also, the R-Squared is 13.6%.

Table 8
OLS Regression of cee Model

cee	Coef.	Std. Err.	t	P>t
bs	.005	.006	0.84	0.401
bind	.001	.001	1.12	0.267
bgd	.002	.002	1.41	0.161
bso	-.002	.001	-3.29	0.001
acs	.046	.023	2.02	0.046
bio	.002	.0004	3.60	0.001
bgo	-.011	.0034	-2.83	0.006
bfao	-.001	.003	-0.36	0.723
bfoo	.054	.032	1.68	0.096
_cons	-.227	.146	-1.56	0.123
Prob > F = 0.000				
R-squared = 0.379				

Source: Authors' Computations using STATA 13

Table 8 reports the results of the *cee* model and shows that internal corporate governance has significant effect on capital employed efficiency (Prob > F = 0.000). The R-Squared is 37.9%.

Table 9

OLS Regression of hce Model

hce	Coef.	Std. Err.	t	P>t
bs	-.110	.299	-0.37	0.715
bind	-.043	.0389	-1.10	0.275
bgd	.099	.082	1.21	0.228
bso	.001	.025	0.04	0.966
acs	.589	.732	0.81	0.423
bio	.030	.018	1.71	0.091
bgo	.513	.102	5.01	0.000
bfao	-.065	.038	-1.72	0.090
bfoo	-.953	.930	-1.02	0.308
_cons	5.314	3.891	1.37	0.176
Prob > F = 0.000				
R-squared = 0.1275				

Source: Authors' Computations using STATA 13

Table 9 reports the results of *hce* model and shows that internal corporate governance has significant effect on human capital efficiency (Prob > F = 0.000). The R-Squared is 12.75%.

Table 10

OLS Regression of sce Model

sce	Coef.	Robust Std. Err.	t	P>t
bs	-.0139219	.0121101	-1.15	0.254
bind	-.0016606	.001552	-1.07	0.288
bgd	.007203	.0033981	2.12	0.037
bso	.00006	.0007149	0.08	0.933
acs	.0438131	.0305276	1.44	0.155
bio	-.0014173	.0009797	-1.45	0.152
bgo	.0125975	.0044594	2.82	0.006
bfao	-.0045987	.0016788	-2.74	0.008
bfoo	-.107645	.0449109	-2.40	0.019
_cons	.8752815	.210449	4.16	0.000
Prob > F = 0.0000				
R-squared = 0.275				

Source: Authors' Computations using STATA 13

Table 10 reports the results of sce model and shows that internal corporate governance has significant effect on structural capital efficiency (Prob > F = 0.000). The R-Squared is 27.5%. For the purpose of testing the hypotheses, the R-Squared of the four models were ranked since all the models have equal model fitness measured by Prob > F = 0.000. Thus, model *cee* with R-Squared of 37.9% was used to test the hypotheses, draw conclusions and make recommendations.

Given the results in Table 8, Hypotheses 1, 2, 3, 8 and 9 are accepted since their p-values are not significant, that is, they are greater than .05. However, Hypotheses 4, 5, 6 and 7 are rejected since their p-values are less than .05. The results in Table 8 indicate that board size has a positive but insignificant effect on intellectual capital (t-value = .84, p-value = .401). This agrees with Abeyshekera (2010) and Oba et al. (2013) but in contrast with Kamath (2019). Also, Table 8 indicates that board independence has a positive but insignificant effect on intellectual capital (t-value = 1.12, p-value = .267). This contrasts differently with Al-Musallai and Ismail (2012), Mahmudi and Nurhayati (2014) and Kamath (2019) who found significant negative effect. The results in Table 8 further indicate that board gender has positive but insignificant effect on intellectual capital. This is in line with Williams (2001) and Zahn and Mitchell (2004) but in complete contrast with Komalaa and Fuad (2017 who found significant negative effect.

Also, the results in Table 8 indicate that board share ownership has significant negative effect on intellectual capital. This agrees with the results of Bohdanowicz and Urbanek (2013) and Al-Sartwai (2018) both found significant negative effect. However, Table 8 shows that audit committee size has significant positive effect on intellectual capital. This is in line with Mahmudi and Nurhayati (2014) but in contrast with Naimah and Mukti (2019) who did not find any significant effect. Table 8 also shows that board institutional ownership has significant positive effect on intellectual capital. This is in line with Shahveisi et al. (2017) and Mukti and Istianingsih (2018), however, contrasts with Al-Sartawi (2018).

Furthermore, the results in Table 8 show that board government ownership has significant negative effect on intellectual capital. This agrees with the results of Al-Sartawi (2018) and Kweh et al. (2019) both found that board government ownership has significant negative effect on intellectual capital. Table 8 also indicates that board family ownership has negative but insignificant effect on intellectual capital. This result is in agreement with Nassar et al. (2018). While Saleh et al. (2009) and Mukti and Istianingsih (2018) found negative effect, it is not significant. Finally, the results in Table 8 indicate that board foreign ownership has positive but insignificant effect on intellectual capital. Bohdanowicz and Urbanek (2013) found negative effect; Al-Sartawai (2018) and Nassar et al. (2018) both found significant negative effect.

CONCLUSIONS AND RECOMMENDATIONS

The objectives of the paper have been achieved. The results demonstrate that audit committee size, government ownership, institutional ownership and share ownership are significantly related to intellectual capital. However, board size, outside board directors, women on the board, family ownership and foreign ownership have no significant effect on intellectual capital. This paper, therefore, concludes that some internal corporate governance mechanisms have significant effects on intellectual capital. This study discusses these relationships which were less discussed in previous empirical studies, and therefore, provides further reference materials. External corporate governance instruments (e.g., legal environment, market control, external auditors, stakeholders' activism, rating organizations and the media) should be included in future studies. The study clearly indicates what factors lead to effective internal corporate governance in relation to contributing to firm's intellectual capital performance. Thus, listed oil and gas companies should (i) reduce directors' shareholding, women directors. However, the

firms should increase audit committee size to 6, being the maximum allowable, and also increase the percentages of institutional ownership and foreign ownership.

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