THE IMPACT OF INTELLECTUAL CAPITAL ON THE PERFORMANCE OF FIRMS IN NIGERIA

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Abstract
There is a consensus across both theoretical and empirical literature on the positive contributions of intellectual capital [IC] – which is constituted by the intangible assets of the firm – to the growth and value-creation of any organisation. Nigerian firms are also not being left out in the growing wave and importance of knowledge-driven activities and investment in the competitiveness and performance of firms. This study investigates the impact of each of the components of IC on the performance of Nigerian firms. Using the Value Added Intellectual Capital (VAIC™) approach of Pulic (2002) as a measure, this study through static panel data methodology examines the relationship between IC and firms' performance. The findings show that VAIC™ influences the performance of these firms positively. However, each of its components indicates different results. While both the structural and human capital components have positive relationship, the capital employed component has a negative relationship. Although this result reflects a positive relationship between performance and intellectual capital of firms, the non-significance of the coefficients obtained reflects that the bulk of Nigerian firms have emphasised so much on their tangible assets. The implication of this finding is that Nigerian firms have laid so much emphasis on their tangible assets with almost a total neglect of the intangibles. Ordinarily, it is expected that the corporate policy of any firm should be such that, it is directed towards the efficient management of its intellectual capital. This derives from the fact that the efficient and effective management of firms' intellectual capital and other intangible assets components could guarantee better performance and return from the tangible.
Keywords: Intellectual Capital, VAIC™, Performance, Nigerian firms, Panel Data.

1. Introduction

Penrose (2009) defines a firm as a collection of productive resources by distinguishing between physical resources and human resources. While the physical resources of a firm are tangible assets, the human resources are the intangible assets. Intellectual Capital (IC) is a vital intangible asset which is characterised by knowledge-driven intensive economy with heavy reliance on technology.in today's business environment. Various classifications schemes and components have been presented in literature. However, there is a convergent taxonomy among literature which categorises intellectual capital into three components:

(i) Human capital, which is the primary component of intellectual capital since human interaction is the critical source of intangible value in the intellectual age. It includes knowledge, professional skills and experiences, expertise, educational level and creativity of employees (Hosnavi and Ramezan, 2011).

(ii) Structural capital, which represents organisation's capacities to meet both internal and external challenges. It includes innovation capital, databases, software systems, distribution networks, organisational charts, corporate culture, strategies and policies (Sillivan 1999).

(iii) Relational capital encompasses the knowledge embedded in the relationships among stakeholders that impacts an organisation's existence and functionality. It includes relationships for building, maintaining and renewing resources, structures and processes of the organisation. It is noticeable in such activities as marketing channels, customer relationships and relationship with suppliers, customer loyalty, government and industrial networking, intermediaries or partners (Malhotra, 2002).

The relevance of intellectual capital on the competitiveness and performance of firms is becoming a growing subject of discussion in the business world. Firms in the modern era of knowledge-based economies are shifting emphasis from tangible assets to intellectual capital as the dominant driver of their value.

Although, the importance of intellectual capital and its management to the organisation is not really a new phenomenon, however, reflecting on the growing importance of intellectual resources scholarly attention has arisen on the various aspects of intellectual capital measurements and its impact on the growth of organisations since the mid 1990s. The literature has shown that intellectual capital plays an important role in organizational performance (Bollen, Vergauwen & Schnieders 2005; Chang, Chen, Lai 2008; Pulic 2002; Tan et al. 2007). Presently there is no uniform understanding of the phenomenon as far as reserahers are aware. However, all its definition and empirical investigations revolve around human and knowledge management capital of organisations (e.g. Alcaniz, Gomez-Bezares &

Roslender 2011; Lin & Edvinsson 2011; Kotenkova & Korablev 2014).

The bulk of studies carried out on intellectual capital attempts to overcome the limitations of conventional indicators that are based on tangible assets which are used to explain, measure, and manage organizational performance. These studies examined intellectual wealth from a more comprehensive perspective and constructed methods for identifying, describing, measuring, reporting, and valuing intangibles in organizations, regions, networks, and nations (Kianto et al. 2013). This is evident in the large amount of researches and conceptual works on the nature, components as well as tools for reporting intellectual capital (Edvinsson & Malone, 1997; Viedma, 2000; Pulic, 2002; Andriessen, 2003).

Furthermore, also critical a to firm's growth, value and prosperity is gaining and retaining its competitive advantage. Empirical studies have suggested that intellectual capital influence on performance could be hampered by series of factor. For example, following the implementation of the Structural Adjustment Programme (SAP) in Nigeria the performance of the manufacturing sector has been adversely affected. A major fall out of this reform is that the economic situations of the country degenerated to such a deplorable level that most of the manufacturing companies converted to warehouses, for refilling and packaging of finished imported goods, thus symbolizing a virtual collapse of the industrial sector, i.e. deindustrialisation. This situation perhaps explains why many multinational companies, such as Dunlop Nigeria and Michelin Nigeria divested from Nigeria to other West African countries, like Ghana (Isola, 2016).

It is also a common knowledge that many textiles industries in Nigeria have also relocated to Ghana. In addition, brain drains in Nigeria took a dramatic turn after the implementation of SAP with massive exodus of professionals, high-level manpower and skilled workers from the country. The International migration organisation documented that Nigeria, alongside three other countries – Ethiopia, Ghana and South Africa - is a major contributor to loss of intellectual capital in Africa (Adefusika, 2010). Nevertheless, the performances of some firms are still very vibrant in Nigeria. The pertinent question that arises is that to what extent can intellectual capital explain

the performance of firms in Nigeria?

The need for this investigation derives from the fact that a vast amount of literature exists which suggests a consensus on the important role played by intellectual capital on firms' performance. Although, no uniform theoretical understanding exists on the phenomenon, studies carried out on intellectual capital revolve around its conceptual definition and components (Abeysekara 2008). The bulk of these studies attempt to overcome the limitations posed in using tangible assets of firms as indicators to explain, measure and manage firms' performance. This is evident in the large amount of literature and conceptual works on the nature, components and tools for reporting intellectual capital. A great deal of empirical research has been carried out to examine the impacts of intellectual capital on firms' performance. Most of the results have shown a positive relationship between intellectual capital and firms' performance. But is this the same for Nigerian firms? The motivation for this study, therefore, is the desire to evaluate empirically the impact of intellectual capital on the performance of firms in Nigeria. By focusing on Nigerian firms, the study provides supporting evidence from an emerging country's perspective. The empirical investigation further extends to capturing the impact of each of the different components of intellectual capital (human capital, structural capital and relational capital) on performance.

Finally, vast amount of empirical literature on intellectual capital has been carried out using descriptive and content analysis to examine the impact of intellectual capital on firm's performance. However, this study adopts a panel data econometric analysis. Data on intellectual capital and performance of 97 Nigerian firms are collected over a 15-year period. The rest of this paper is structured as follows; we provide the review of existing literature in section 2 while section 3 focuses on the methodology of the study. The results and conclusion and recommendations are presented in sections 4 and 5 respectively.

2. Literature Review

The intensification of theoretical and empirical research on intellectual capital has been a major task of modern economic science (Dyakona, 2015). Theoretically,

intellectual capital is rooted in both management and macroeconomic theory, and it is based on the premise that undisclosed intangible assets of the firm are crucial in the firm's operations since they have the capacity to significantly improve the firm assets and market value (Radjenovic and Krstic, 2017).

Harris (2000) categorises intellectual capital theory into static and dynamic components. The static theory of intellectual capital is derived from the interactions of the key components that made up intellectual capital – human capital, organisational capital, and customer capital, with their interactions making up the value capital (Edvinsson and Malone, 1997). The dynamic theory of intellectual capital is premised on the constant exchange of information and knowledge between the human capital and designed systems (Radjenovic and Krstic, 2017). It analyses intellectual capital through the systems theory by completely eliminating the relational capital from the structure of intellectual capital. Through the systems theory, intellectual capital connects individuals to the entire organisational processes in order to enable the verification of compliance that every individual and process in the organization is associated with their respective strategic plans and business objectives of the organisation (Harris, 2000).

Large number of empirical studies on intellectual capital, in the wake of the 20th century, have largely focused on the conceptual definitions and disclosure of intellectual capital by firms (see Bontis 2003; Guthrie and Petty 2000; Brennan 2001; Striukova et al 2008; April, Bosma & Deglon 2003; Abeysekara 2008). The component of intellectual capital is described as comprising organizational processes and procedures, technologies possessed, exclusive privileges, skills of the employees and organizational customers, suppliers and stakeholders, all of which are not exclusively reported in financial statements (Stewart, 1997).

The lack of a uniform definition, measurement and valuation of IC has contributed to the differences in the approaches adopted by empirical studies. The impossibility of assigning monetary values is another point made by authors who approached the IC study using survey-based techniques to justify the problem. The general consensus based in the findings from these studies attest to the significant role of intellectual

capital on firms' performance. For instance, Abdulai, Kwon and Moon (2012) designed a questionnaire based on different theoretical perspectives and developed a model to assess the relationship between intellectual capital and performance of 83 software firms in West Africa. The partial least square estimates of the study confirmed a significant relationship between intellectual capital, competitive capabilities and performance of these firms.

Similarly, in another study on the influence of intellectual capital on the performance of Islamic banking sector in Malaysia, Khalique, Shaari, Isa & Samad (2013) used Pearson correlation and multiple regression analysis and established that intellectual capital has a significant influence on performance. Sofian, Tayles and Pike (2007) through a survey of over 100 large companies in Malaysia examined the impact of the degree and form of intellectual capital on performance measurement and corporate performance. The study revealed that intellectual capital, whatever form it takes, whether in the form of knowledge, experience, professional skill, good relationships, or technological capacity, is a major source of corporate competitive advantage.

Attempts to develop quantitative techniques to measure intellectual capital have also been documented in the literature. Prominent among these measurement approaches is Pulic's Value Added Intellectual Capital Coefficient (VAIC™) postulated by Pulic (2002). The VAIC™ approach to measuring IC has been widely accepted in empirical literature due to a number of reasons. First, the method is straightforward and easily applicable. Second, verification of the data used in its computation is assured as they are readily available in firms' financial accounts and reports. Third, the value obtained for VAIC™ is also objective and facilitates inter-industry and cross national comparisons among related and unrelated firms. Lastly, firms could use VAIC™ as a yardstick to evaluate internal performance.

Isola, Odekunle and Akanni (2017) surveyed empirical literature on IC – performance relationship based on the VAIC™ method, the findings of the reviewed studies largely support a positive relationship between IC and the performance of firms. Quite a number of the surveyed studies revealed that the different dimensions of IC (that is, structural capital, human capital and capital employed components) possess only little value and impact on the performance of firms when considered separately, however they are strong performance driver when combined (see Inkinen, 2015).

From the foregoing discussion, it is apparent that while some authors found a positive relationship between intellectual capital and performance, the reverse is the case for other studies. Perhaps, this may be due to country specific reasons[1] or methodological

[1] Productivity and performance of firms have been established to differ from country to country as a result of country-specific factors such as home-market characteristics and homogeneity in operating and regulatory environment (Acemoglu and Dell, 2010)

differences that the various researchers have adopted in their studies. Marr, Schiuma & Neely (2004) argued that intellectual capital resources are contextual specific, and that intellectual capital disclosures are different from one context to another due to social, political, and economic factors. A fall out of these contrasting findings has created the room for further investigations of the impact of intellectual capital on performance of firms.

3. Research Methods

This study used a panel data set consisting of publicly quoted firms listed on the Nigerian Stock Exchange (NSE). The selection of the listed firms is guided by the availability of information on them as they are required by law to make public and available their annual financial reports and accounts which contains all the data required for this study. A total of ninety-seven (97) firms were selected based on the availability of data, spanning between 1999 and 2014. The choice of the period under investigation is informed by the availability of complete information on variables of interest.

The choice of variables and their proxies is guided by the existing literature. The measure of performance used in this study is the return on assets (ROA). ROA is measured as the ratio of operating profit and total assets. Based on its construction, ROA is a good approximation of the extent to which firms' resources are put to efficient use. Although, ROA being an accounting measure of performance has been criticised on the ground that it suffers from the effect of different accounting standards. However, it is capable of mitigating size bias in the results.

Intellectual capital will be measured following Pulic (2002) value added intellectual coefficient (VAIC^{TM}). VAIC™ monitors and measures the value creation efficiency in the company based on accounting figures. It incorporates three components: (1) human capital efficiency (HCE) calculated as the ratio of value added and human capital (that is VA/HC) and it captures the knowledge, professional skill, experience and innovativeness of employees within a firm, (2) structural capital efficiency (SCE) is measured as the ratio of structural capital (the difference between value added and human capital) and value added (that is SC/VA), and (3) capital employed efficiency (CE) which is the ratio of value added and capital employed. VAIC^{TM} is the sum of HCE, SCE and CCE, and it is the proxy for intellectual capital in this study.

Model

In order to estimate the impact of intellectual capital on firm performance, our baseline model follows the static theoretical categorisation of intellectual capital (Harris, 2000) and it is premised on extant empirical literature on the relationship between intellectual capital and performance indicators of firms (see Firer & Williams, 2003; Khalique et al., 2013; Inkinen, 2015). The baseline model is proposed as

$$ROA_{i,t} = \alpha + \lambda_i + \beta_1 VAIC_{i,t} + \varepsilon_{i,t}$$

where $ROA_{i,t}$ is return on assets of firm i at time t; α is the constant term; λ_i represents firm specific fixed effect; $VAIC_{i,t}$ is the value intellectual capital coefficient to measure intellectual capital of firm i; and $\varepsilon_{i,t}$ is the error term.

The longitudinal nature of this study in terms of the number of firms and period considered required a panel data method. Panel data methods have become more common than ever as an econometric tool for modelling individual behaviours (among firms, consumers, households and so on), partly as a result of the development of powerful software for panel data estimation, and partly through the availability of high quality longitudinal data. The choice of panel model is to disentangle components of variance and the dynamics of cross-sectional attributes across the firms. The relationship between the performance and intellectual capital as captured in the above equation is represented in a static form. In order to isolate its impacts and for simplicity, it is assumed that performance of firms is mainly explained by intellectual capital while other factors remained constant. Hence, all equations are estimated using static panel regression models. However, the Hausman (1978) specification test is first carried out in order to assess the suitability of the fixed effect models against random effect models. In order to achieve a robust result, each of the components of VAIC™ is regressed on ROA so as to determine the individual impact of the components of intellectual capital on the performance of the firms.

4. Results and Discussion

The starting point of our empirical investigation is the descriptive analysis of the variables. Table 1 shows the descriptive statistics of each of the variables of the model. It clearly depicts the behaviour of the data collected for each of these variables across all firms included in the study. For instance, the ROA which measures the performance of the firms shows that the average return on asset of these firms is 0.08, with the lowest return on asset reporting a negative value at -6.76 and maximum at 7.40. The values of Jacque-Bera statistic show statistical significance at 1% level across all the series. Hence, the null hypothesis that the series are non-normal is rejected as the series are normally distributed.

Table 1: Descriptive Statistics of intellectual capital components and performance

Statistics	ROA	CEE	HEE	SEE	VAIC
Mean	0.08	6.20	2.88	0.37	9.47
Std. Dev.	0.37	97.87	3.42	8.75	97.61
Min.	-6.76	-954.02	-27.54	-246.84	-830.46
Max.	7.40	2824.54	49.38	164.86	2827.06
Skewness	4.11	23.54	3.15	-9.25	23.90
Kurtosis	232.75	652.74	53.37	557.67	656.63
JB Stat.	3171188***	25462891***	154587.7***	18479994***	25771224***

Note: JB Stat. is an acronym for the Jacque-Bera Statistics. *** represents statistical significance at 1% level.

The pairwise correlation coefficient between all the variables is presented in Table 2. The value depicts the direction of relationship between intellectual capital and each of its components and performance. The relationship between return on asset and intellectual capital of the firms, as measured by the VAIC™, reveals a positive but weak coefficient. Similarly a positive correlation coefficient is obtained between ROA

and the human capital and structural capital components of intellectual capital (HEE and SEE respectively), while the capital employed efficiency (CEE) is negatively correlated with ROA. Overall, the correlation coefficients depict a positive directional relationship between intellectual capital and performance.

Table 2: Pairwise Correlation Result of intellectual capital variables and ROA

	ROA	CEE	HEE	SEE	VAIC
ROA	1				
CEE	-0.0036	1			
HEE	0.0656	-0.0014	1		
SEE	0.0311	-0.0964	0.0246	1	
VAIC	0.0084	0.992	0.0277	0.0089	1

To choose between the fixed effects and random effects model, Table 3 presents the Hausman specification test carried out. Statistically, fixed effects are always a reasonable thing to do when working with panel data as they always give consistent results. However, they may not be the most efficient model to run. On the other hand, random effects gives a better P-values as it is a more efficient estimator, hence it is ideal to carry out the random effects if it is statistically justifiable to do so. The Hausman test checks a more efficient model against a less efficient but consistent model to make sure that the more efficient model also gives consistent results. The Hausman test compares fixed and random effect models under the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator (Hausman, 1978).

Table 3: Hausman Specification Test Result

	Explanatory Variable(s)	Hausman Statistic	P. Value	Remark
Model I	CEE	0.07	0.7922	Random Effect
Model II	HEE	1.41	0.2354	Random Effect
Model III	SEE	3.12	0.0771	Fixed Effect
Model IV	VAIC	0.02	0.8782	Random Effect
Model V	CEE, HEE, SEE	3.52	0.3186	Random Effect

The results of the Hausman specification test is presented in Table 3. The result shows that the estimated Hausman statistic supports the Random effects model for virtually all the models. Thus, the Random effects model is used for the estimations and the results are summarised in Table 4.

Table 4: Panel Regression Results
Dependent Variable: ROA

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.077963 (0.016919)***	0.063494 (0.016849)***	0.077638 (0.016894)***	0.077581 (0.016974)***	0.063247 (0.016824)***
CEE	-0.000003 (0.000010)				0.000003 (0.000016)
HEE		0.005023 (0.004905)			0.004998 (0.004900)
SEE			0.000828 (0.000280)***		0.000812 (0.000255)***
VAIC				0.000038 (0.000047)	
Obs.	1,440	1,440	1,440	1,440	1,440

Note: ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

Table 4 presents the panel regression estimation results using the random effects model. Models 1 to 4 present results of different specifications wherein the impact of each of the components of the intellectual capital alongside the control variables included in the model are used. Model I shows the result of the relationship between the capital employed component and the firms' return on assets. The estimated coefficient shows a negative relationship between the two variables. On the other hand, the relationship between the human capital component and performance reported in Model II is positive. However, both coefficients are not statistically significant.

Model III of the table shows the result of the estimation with the structural capital component as the explanatory variable. The estimated coefficient shows a positive and statistically significant relationship with ROA. The estimation of all the three variables as independent variables is presented in Model V. The result shows that each of the variables has a positive impact on ROA, whereas only the structural capital is statistically significant. The combination of the three components to give the VAIC™ is presented in the column IV of the table. The result shows a positive relationship. Despite the different signs of the coefficient of each of the three components, the estimated coefficient of VAIC™ reflects that intellectual capital influence the performance of these firms positively.

The result presented supports some of the findings of previous studies on intellectual capital and performance, most especially studies that used VAIC™ as the measure of IC. Studies like Chen et al (2005) carried out on Taiwanese firms reported an identical relationship between intellectual capital and performance of these firms. Similar studies by Gan and Saleh (2008) and Shiu (2006) both conducted on Malaysian firms but found a positive relationship between VAIC™ and performance variables.

On the other hand, other studies have similarly reported a negative relationship between VAIC™ and performance. Firer and Williams (2003) found out that there is

no statistical relationship between VAIC™ and performance of South African firms. Also, Dimitrios Dimitrios, Charalampos, & Georgios (2011) presented an empirical result that failed to support the importance of intellectual capital, using the VAIC™ methodology, on firms' performance.

An important question that arises from the foregoing empirical results is whether VAIC™ provides coherent results in terms of its effectiveness and reliability as a measure of intellectual capital. There is a critical need to situate the context within which these studies that used the VAIC™ methodology are carried out. As noted by Dimitrios et al (2011), the ease of the implementation of the VAIC™ compared to other available measures of intellectual capital has led to its widespread use in developing and emerge economies, such as Bangladesh, Malaysia and South Africa. Another argument for the use of the VAIC™ is the fact that its technique is based on fundamental accounting measurements and as such it has a limited reporting requirement. Hence, the absence of sophisticated and advanced accounting practises and financial structures in this category of economies makes the VAIC™ as ideal methodology to measure intellectual capital.

Consequently, the reliability of the VAIC™ as a measure of intellectual capital and its failure to significantly estimate and verify the relationship between intellectual capital and performance measures should not be attributed to the reliability of the VAIC™ measure but on the attitude of these firms by not placing the necessary significance on their intellectual assets as well as the inefficiencies and ineffectiveness of the regulatory institutions available in the countries these firms operates. Companies have emphasised so much on their tangible assets while almost totally neglecting the intangible ones. Hence, it has become logical that models based on the VAIC™ methodology to measure the intellectual capital of firms and their impact on other firms variables, might fail to establish the true relationship (Malhotra 2003).

5. Conclusion and Recommendations

The central aim of this study is to examine the impact of intellectual capital on the performance of firms in Nigeria. It is not a new phenomenon in both behavioural and finance literature that intellectual capital and its management is vital to the survival and sustenance of an organisation. Scholarly attention has arisen on the various aspects of intellectual capital measurements and its impact on the growth of organisations.

Using the Pulic (2002) VAIC™ approach as a measure of the intellectual capital, this study through the deployment of the static panel data methodology examined the relationship intellectual capital and firms' performance, measured using firms' return on assets. The empirical findings show that the estimated coefficient of VAIC™ influence the performance of these firms positively. However, each of its components reports different results. Both the structural and human capital components have positive but the physical capital component has a negative relationship.

As a result of the non-significance of some of the reported coefficients of the components of VAIC™, it can be inferred that the bulk of Nigerian firms have emphasised so much on their tangible assets with almost a total neglect of the intangible assets of which intellectual capital is a major component. However, it is expected that the corporate policy of any firm should be such that it is directed towards the efficient management of its intellectual capital. This derives from the fact that the efficient and effective management of firms' intellectual capital and intangible assets could guarantee a better performance.

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