

# Effect of Intellectual Capital on Performance of Non-Financial Firms in Nigeria

Nnubia, Innocent Chukwuebuka<sup>1</sup>, Okolo, Marvis Ndu<sup>2</sup>, Emeka-Nwokeji, N. A. (Ph.D)<sup>3</sup>

<sup>1,3</sup>*Department of Accountancy, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus, Anambra State, Nigeria.*

<sup>2</sup>*Department of Accountancy, University of Nigeria, Enugu Campus, Nigeria.*

**Abstract:-** The study investigates the effect of intellectual capital on performance of non-financial firms in Nigeria. A sample of 21 Nigerian non-financial firms listed on Nigerian Stock Exchange for a period of 10 years (from 2007-2016) was selected. The main type of data used in this study is secondary; sourced from the Nigerian stock exchange fact book and internet. This study applied ex post facto research design. The data collected were analysed using Ordinary Least Square Method. The results show that for the Nigerian listed non-financial firms, the explanatory variables – capital employed efficiency, human capital efficiency and structural capital efficiency has positive significant effect on the dependent variable – earnings per share and market to book value (Performance). The study, therefore recommends among others that the organization can achieve sustainable value with investment on intellectual capital and with focusing on intellectual capital; they can move from the economy based on the tangible assets towards economy based on the intangible assets.

**Key words:** intellectual capital, firm performance, non-financial firms, Nigeria.

## I. INTRODUCTION

### 1.1 Background to the study

The global market is continuously moving towards knowledge and technological innovation, seeking methods to increase competitive advantage. Over the years, intellectual capital has been synonymous with intangible assets and knowledge capital. In the last two decades, numerous scholars have contributed and analysed the role and the relevance of the intellectual capital to the performance and value creation capabilities of the Companies (Roos & Roos, 1997; Sveiby, 1997; Teece, 2000).

Intellectual Capital (IC) has been recognised as a set of intangible (resources, capabilities and competences) that drives the performance of organization and its value creation (Roos & Roos, 1997; Bontis, 1998; Bontis, Keow & Richardson, 2000). However, intangible assets rarely affect performance directly. Instead, they work indirectly through relationships of cause and effect (Kaplan & Norton, 2004). The importance of intellectual capital has been disclosed and scrutinized by many scholars. Handy (1989) was of the opinion that intellectual assets are three or four times the tangible book value of a firm. Handy (1989) further revealed that intangible assets constitute more than two-thirds of the firm value while, Osborne (1989) stipulated that eighty percent of a firm value is intangible. According to Stewart

(1991), traditional accounting measures are not adequate to establish the real value of the firm in the so-called “knowledge-based society”. Thus, valuing intellectual capital (IC) is vital to enabling enterprises to appreciate their exact firm value.

Companies are likely to produce intellectual capital performance measures due to the realization of its significance. The management, based on these measures, should be in place to give inspirations for employees to behave in a way that will grow the company’s intellectual capital value. Once companies recognize particular item of intellectual capital, they can categorize and invest in human capital, structural capital and relational/customer capital to boost firm value. Finally, the fact remains that if companies invest in the above mentioned parameters they may achieve a higher competitive advantage over the antagonistic markets.

### 1.2 Statement of the Problem

The significance of intellectual capital on organizational success has become crucial in the context of what has become known as the knowledge-based economy which is characterized by a rapid expansion of knowledge-intensive industries and by a marked increase in the importance of creating and exploiting knowledge and information in all sectors of the economy (Nonaka and Takeuchi, 1995; Ogbo, Ezeobi & Ituma, 2013). Despite an increasing recognition of its importance in the knowledge based economy, only a few research works has been devoted to understanding the relationship between intellectual capital and firms’ performance in Nigeria.

Several studies on intellectual capital have focused on Western Countries (particularly North America and Europe) (Ogbo et al., 2013). To date, few scholars have focused on the effect of intellectual capital on firms’ performance in the Nigerian banking sector. This is surprising, according to Ogbo et al (2013), given that many scholars (Lu, Wang, Tung & Lin, 2010) argue that intellectual capital development is the hidden value that is not reflected in organizational financial statements but has the potential to contribute to organizational profitability.

Considering non-financial firms in any country, this also plays a pivotal role in setting the economy in motion and in its developmental processes. Non-financial firms promote growth and success of business of businesses in both developed and

developing countries. According to Kamath (2007) and Ekwe (2013), the non-financial firm sectors especially service firm is an ideal area for intellectual capital research because it is “intellectually” intensive and its employees are (intellectually) more homogeneous than those in other economic sectors (Engstrom, Westnes, & Westnes, 2003). Furthermore, most of the researches on intellectual capitals centred mostly on developed economies with regards to banking sector and therefore, this study seeks to provide empirical evidence of the effect of intellectual capital components on performance of non-financial firms in Nigeria.

### 1.3 Objectives of the Study

The main aim of this study is to investigate the effect of intellectual capital on performance of non-financial firms in Nigeria. Specifically, the other objectives are to:

1. determine the effect of capital employed efficiency on performance of non-financial firms in Nigeria.
2. ascertain the effect of human capital efficiency on performance of non-financial firms in Nigeria.
3. examine the effect of structural capital efficiency on performance of non-financial firms in Nigeria.

### 1.4 Research Hypotheses

Based on the research objectives, the following hypotheses have been formulated in order to empirically investigate the effect of intellectual capital on performance of non-financial firms in Nigeria.

1. Capital employed efficiency does not significantly affect performance of non-financial firms in Nigeria.
2. Human capital efficiency does not have any significant effect on performance of non-financial firms in Nigeria.
3. Structural capital efficiency does not significantly affect performance of non-financial firms in Nigeria.

## II. REVIEW OF RELATED LITERATURE

### 2.1 Conceptual Framework

#### 2.1.1 Intellectual capital

Intellectual capital arguably is one of the most popular concepts in the field of human resource management. The concept has attracted a growing interest in recent years in the management field, especially due to its association with firm's performance. Engstrom, Westnes and Westnes (2003) stated that various studies have made attempt at providing one acceptable definition for intellectual capital but have not yet succeeded and as such there is no generally agreed definition of intellectual capital. However, some definitions are noted here: Bartholomew (2008) defines intellectual capital as an asset which related to the employees abilities, company's internal structure and its external relation with customers. Employees' abilities include their skills, experience and education; while company's internal structure means its

administrative policies, procedures and systems (Awan & Saeed, 2015).

Bontis (1996) defined intellectual capital as the difference between a firm's market value and the cost of replacing its assets. It is those things that we normally cannot put a price tag on, such as expertise, knowledge and a firm's organizational learning ability. As cited in the work of Awan and Saeed (2015), Btewart (1997) discussed the components of intellectual capital such as organizational process and procedures, technologies processed, exclusive privileges, skills of the employees and organizational customers, suppliers and stakeholders. He stated that intellectual capital consists of all organizational process and intangible assets that are not shown in financial statements. Therefore, one can said that intellectual capital deals with articular, reasonable, knowledgeable and substantial fruits of the mind. It claims intangible (tacit) and tangible (explicit) dimensions which do not mutually exclude, but actually complement each other. The conversion of knowledge into a valuable asset has come to be known as an intellectual asset or intellectual capital (Kok, 2007).

#### 2.1.2 Firms Performance

Performance can be explored from two points of view: financial and organizational (the two being interconnected); a company's performance can be measured based on variables that involve productivity, returns, growth or even customer satisfaction. Financial performance is an indicator of the firm's attainment of economic or financial objectives. The long term survival and value of a firm is dependent on its ability to maintain desirable profit levels through its operating activities. Information regarding a firm's financial performance is obtained from the financial statements on which stakeholders base their decisions in terms of either investment or sustenance of contractual business relationships with the entity.

The most common measures of a firm's financial performance are categorized into Profitability and Market value measures. Profitability is an indication of the efficiency with which the operations of the business are carried out i.e. profitability is related to operating performance which can be measured in various ways such as Return on Assets and Return on Equity, together, commonly referred to as returns on the investments made to generate them. These ratios express the relationship of a firm's earnings defined as Profit After tax with its capital employed. Return on Equity measures the return earned on funds contributed by a company's ordinary shareholders. Since ordinary shareholders of a company are the owners who bear the greatest degree of risks with regard to the capital they have contributed. ROE is viewed as one of the most important financial ratios to measure the ultimate profitability of their investment. Return on Asset is a form of measure of a firm's Return on Capital Employed which indicates how efficiently are firm is putting resources at its disposal such as assets in maximizing profitability. This indicator shows the relationship of earnings to assets of a firm.

Earnings as previously highlighted, is defined as Profit after Tax. However, some schools of thought prefer to define it as profit before interest and taxes in order to curtail the effects or implications of the method of financing in the acquisition of assets e.g. the use of debt, and the taxation policies of the business operating environment. Subsequent to the individual and aggregate definitions of ROE and ROA as measures of return on investments, the distinction between these two can further be highlighted in terms of the entity to which returns are measured as accruing to. ROA measures returns to the providers of capital irrespective of the form of capital provided- equity or debt. ROE on the other hand, can be viewed as a penetrating measure of returns to the providers of equity capital i.e., the ordinary shareholders.

#### *Capital Employed Efficiency*

Pulic (1998) states that capital employed efficiency (CEE) is the ratio of total Value Added (VA) divided by the total amount of Capital Employed (CE), where capital employed is defined as the book value of a firm's net assets. Frustrated managers often do not recognize that they can tap into a wealth of knowledge from their own clients and suppliers. Understanding better than anyone else what customers want in a product or a service, is what makes someone a business leader as opposed to a follower. Customer and supplier loyalty, target marketing, longevity of relationships and satisfaction are all measurable elements of this form of intellectual capital (Bontis, 1996).

#### *Human Capital Efficiency*

Total salary and wage costs are indicators of a firm's human capital and human capital efficiency is calculated as the ratio of total Value Added (VA) divided by the total salary and wages spent by the firm on its employees. The term human capital is defined as a combination of the following four factors – genetic inheritance; education; experience; and attitudes about life and business (Ogbo, Ezeobi & Ituma, 2013; Bontis, 2001). Human Capital (HC) is one of the essential variables in the study of intellectual capital, and it is the dimension of intellectual capital which deals with the human knowledge and which will influence a firm's value by affecting the other elements (Ogbo et al., 2013). According to Ahangar (2011), human capital is recognized as the largest and the most important intangible asset in an organization which ultimately provides the goods and/or services that customers require or the solutions to their problems. It includes the collective knowledge, competency, experience, skills and talents of people within an organization.

#### *Structural Capital Efficiency*

In order to calculate structure capital efficiency (SCE), it is first necessary to determine the value of a firm's structural capital (SC). Pulic (1998) proposes a firm's total Value Added (VA) less its human capital is an appropriate proxy of a firm's structural capital (SC) (Ekwe, 2013). Based on prior empirical research findings, Pulic (1998) argues that there is a proportionate inverse relationship between human capital

(HC) and structural capital (SC) in the value creation process attributable to the entire intellectual capital base, the less Human Capital participates in value creation; the more structural capital is involved.

Consequently, Pulic (1998) argues the formula for calculating SCE differed to that for CEE and HCE respectively. Specifically, Pulic (1998) and Ekwe (2013) state that SCE is the ratio of a firm's SC divided by the total VA. Therefore, according to Ogbo et al (2013), structural capital includes technological factors and technical competencies and is highly tacit and enables knowledge to be captured and shared. The literature on SC generally claims that structural capital is the critical link that allows the link between intellectual capital and firm's performance to be measured.

#### *2.2 Theoretical Framework*

The study is anchored on the following theories:

*2.2.1 Direct intellectual Capital Measurement Theory:* With the direct intellectual capital measurement theory, the monetary value of the intangible assets is estimated by identifying the various components. This theory allows for the valuation of separate components of intellectual capital. It also allows for combinations of monetary and non-monetary valuations. It provides a comprehensive overview of all the intellectual capital in the organization. It is event-based and therefore better for relating cause-and-effect compared to financial metrics.

*2.2.2 Scorecard Theory:* In the scorecard theory, various components of intangible assets or intellectual capital are identified and indicators and indices are generated and reported in scorecards. Composite indices based upon the synthesis of all components of intellectual capital can be created. This theory allows for measurement closer to actual inputs, processes, and outcomes. Reporting can therefore be faster. It is also particularly suitable for detection and correction of errors in aligning inputs and processes with the outputs and outcomes. The indicators capture contextual nuances, which result in rich data analyses that can provide useful insights for policy making.

#### *2.3 Empirical Studies*

Awan and Saeed (2015) analyzed the concept of intellectual capital, its importance for higher educational institutions and its impact on their working environment and performance. The author selected two universities, namely: Bahaudin Zakariya University Multan and Islamia University Multan and has taken a sample of 200 employees of these Universities: 150 academic and 50 non-academics. The data was collected through a structured questionnaire by conducting face-to-face interview. Three estimation methods were used to analyze the data. Five point likert scales was used to record the view of respondents about the importance of intellectual capital and its management by these two selected Universities. Regression method was used to measure the impact of intellectual capital (independent) variables on

the performance (dependent variables) of these Universities. Scorecard and Ratio Analysis was used to compare the output level of intellectual capital and their relative performance. The study revealed that intellectual capital and organizational performance has a significant correlation and that Bahauddin Zakariya University Multan outperformed Islamia University of Bahawalpur in better output of intellectual capital, its management, and overall performance. The evidence shows that Bahauddin Zakariya University Multan has greater intellectual capital than Islamia University of Bahawalpur. As regard to the components of intellectual capital, human capital ranked first in its impact on performance while structural capital and relational capital has second and third rank. In other words, human capital has greater contribution in creation of intellectual capital and its influence on the performance of these two Universities, out study concludes.

Corcoles (2014) analyze the importance of intellectual capital management as instruments to face the new challenges in European university. The aim of this paper is to provide assistance initiating universities in the process of developing their ability to identify, measure and manage their intangible assets. A review of the most important intellectual capital management initiatives at European universities is shown. The experience gained from the case studies provides a basis to understand how European universities are measuring and managing their intellectual capital. This study helps to define the steps to follow in developing a model of intellectual capital management at universities.

Ekwe (2013) investigates the effect of intellectual capital on employee productivity in the Nigeria banking sector. The study uses the Value Added Intellectual Coefficient (VAIC) model to investigate the effect of the intellectual capital indices (i.e. Human Capital Efficiency, Structural Capital Efficiency and the Capital Employed Efficiency) on the Employee Productivity of banks in Nigeria. The data were collected from the annual reports of six banks and analysis was conducted using longitudinal time series data generated from the annual reports and accounts of the selected banks in Nigeria spanning from year 2000 to 2011. The multiple regression analysis method was adopted for the test of the hypothesis. The SPSS statistical software (version 17.0) was used for the data analysis. The study showed that there was a positive and significant relationship between components of VAIC and employee productivity of the banks in Nigeria (VIAC coefficient = 1.186,  $R^2_c = 0.806$ ,  $R^2_t = 0.49$ ,  $P < 0.05$ ). From the result stated above, it is thus established that indeed intellectual capital has positive and significant effect on Employee Productivity of banks in Nigeria.

Corcoles and Vanderdonck (2013) examine the opinion of the university stakeholders regarding the importance they give to completing the information from university financial statements with information relating to these institutions' intellectual capital. A questionnaire was designed and sent to every member of the Social Councils of Spanish Public Universities. It was thought that these participants would

provide a good example of the attitude of university stakeholders since they represent the different social groups connected with universities. The results of our empirical study allow us to criticize the current accounting information model of Spanish higher education institutions and to recommend extending the limits of universities' annual accounts so as to include the information on intellectual capital demanded by the different stakeholders. Finally, this empirical study identifies which of components of intellectual capital (human, structural and relation) is the most relevant for publication.

Fathi, Farahmand and Khorasani (2013) examined the relationship between intellectual capital and financial performance. The empirical data were drawn from a panel consisting of 49 Iranian companies listed in the Tehran Stock Exchange (TSE), classified in three different industrial sectors observed over ten-year period of 2001 to 2010. Various regression models were examined in order to test the hypotheses included in the proposed conceptual framework. The results demonstrate that there is significant positive relationship between intellectual capital and value added efficiency of structural capital component with the three financial performance measures (ROE, ROA, GR). It also indicate that there is significant positive relationship between value added efficiency of capital employed and value added efficiency of human capital with two independent variables (ROE, ROA) and there is no significant relationship between value efficiency of capital employed and value added efficiency of human capital with growth revenue (GR). This proved that, in the business context, the organization can achieve sustainable value with investment on intellectual capital and with focusing on intellectual capital; they can move from the economy based on the tangible assets towards economy based on the intangible assets.

Ogbo, Ezeobi and Ituma (2013) investigated the effect of intellectual capital on organizational performance in the Nigerian banking sector. A sample of 378 employees of banks in the South Eastern States of Nigeria was obtained. Findings indicated a notable similar pattern of intellectual capital – organizational performance link as found in Western countries of North America and Europe. Findings specifically show that human capital and structural capital have a positive and significant effect on organizational outcomes in the Nigerian banking sector.

Remirez, Tejada and Gordillo (2013) examined the recognition of intellectual capital importance in the university sector. The paper is to know the opinion of the university stakeholders regarding the importance they give to intellectual capital reporting. A questionnaire was designed and sent to every member of the Social Councils of Spanish public universities. The results of our empirical study show that the current annual accounts published by universities barely cover the information needs of the different stakeholders. These results allow us to recommend extending the limits of universities' annual accounts so as to include the information on intellectual capital demanded by the different stakeholders.

In our opinion, the traditional accounting systems do not suffice for higher education institutions, whose value creation depends more on intellectual capital type resources. Finally, this empirical study identifies which of components of intellectual capital (human, structural and relation) is the most relevant for publication. The results show that the information most valued by the different stakeholder groups is that related to relational capital, followed by human and then lastly structural capital.

Asare, Onumah and Simpson (2013) explored the Disclosure of Intellectual Capital (ICD) in Ghana: Evidence from Listed Companies in Ghana and seeks to contribute to fill the dearth in the literature on ICD from the perspective of developing countries. The study examines the ICD of 25 companies listed on the Ghana Stock Exchange (GSE) over a five-year period (2006-2010) through content analysis of their corporate annual reports. The study revealed that the ICD level in annual reports in Ghana is quite high and descriptively reported and though disclosure of IC is improving but at a relatively marginal rate. Therefore looking at the trend of ICDs by the companies, the study recommends the need for accounting regulatory bodies and oversight agencies (local and global) to develop specific standards or guidelines on identifying, measuring and reporting IC. This paper is one of the few studies to have investigated the disclosure of IC in corporate annual reports in Ghana.

Matos, Lopes, Rodrigues and Matos (2012) investigated the importance of intellectual capital management accreditation as a factor in the organizational development of companies,

especially small and medium-sized enterprises (SMEs). The methodology ICMA – Intellectual Capital Management Accreditation (Matos and Lopes, 2009) will be discussed here, as well as the effect of this methodology on SMEs' innovation processes. It is considered that intellectual capital management accreditation may be a relevant process in the consolidation of an innovative dynamic, which will contribute to the continuous creation of competitive advantages. There are various intellectual capital valuation methodologies, but the research about the effect of the certification and accreditation is still very limited so it is necessary to get more results. However, the methodological research that supported the ICMA system points to the fact of accreditation procedures favouring better management of intellectual capital, thus contributing significantly to improving the organizational performance of accredited companies.

Tan, Plowman and Hancock (2007) examined the relationship between intellectual capital and financial performance of companies listed in the Singapore Stock Exchange. For this purpose they used equity, earnings per share and annual return per share as indicators of financial performance and they used Value Added Intellectual Coefficient (VAIC) method for measuring intellectual capital. The results of the study indicated that there is a positive correlation between intellectual capital and the company's future performance. They also concluded that the growth rate of intellectual capital has a positive relationship with firm performance.

#### 2.4 Summary of Empirical Studies

S/N	Name	Topic	Methodology	Findings
1	Awan & Saeed (2015)	Relationship between intellectual capitals and Organizational performance: A case study of public sector university in Southern Punjab-Pakistan.	Pakistan, Three estimation methods & Regression method.	There is a significant correlation between intellectual capital and organizational Performance. Human capital has greater contribution in creation of intellectual capital than structural and relational capital.
2	Corcoles (2014)	Intellectual capital management and Reporting in European Higher Education Institutions.	European countries, Content Analysis	The study found the basis to understand how European Universities are Measuring and Managing their Intellectual capital.
3	Ekwe (2013)	Effect of intellectual Capital on employee Productivity in the Nigeria banking sector.	Nigeria, Value Added intellectual coefficient (VAIC) & Multiple Regression	There is a positive and significant relationship between components of VAIC and employee productivity of the banks in Nigeria.
4	Corcoles and Vanderdonek (2013)	Empirical Evidence for the increasing importance of intellectual capital Reporting in higher Education Institutions.	European countries, Accounting Information model, human, structural and relational.	The study identifies which of components of intellectual capital (human, structural and relational) is the most relevant for Publication.
5	Fathi, Farahmand & Khorasani (2013)	Impact of intellectual capital on financial performance.	Iran, Regression, efficiency of Structural capital, capital employed, human capital and financial performance (ROE, ROA, GR).	There is significant positive relationship between intellectual capital and value Added efficiency of Structural capital Component with the three financial performance measures (ROE, ROA, GR). It also indicate that there is significant positive relationship between value added efficiency of capital employed and value added efficiency of human capital with two

				independent variables (ROE,ROA) and there is no significant relationship between value efficiency of capital employed and value added efficiency of human capital with growth revenue (GR).
6	Ogbo, Ezeobi & Ituma (2013)	Effect of intellectual capital on organizational performance in the Nigeria Banking sector.	OLS Regression	There is a positive and significant effect on organizational outcomes in the Nigerian banking Sector.
7	Remirez, Tejada and Gordillo (2013)	Examined the recognition of intellectual capital importance in the university sector.	Span, Survey, human, structural and relation.	The results of our empirical study show that the current annual accounts published by universities barely cover the information needs of the different stakeholders. This empirical study identifies which of components of intellectual capital (human, structural and relation) is the most relevant for publication. The results show that the information most valued by the different stakeholder groups is that related to relational capital, followed by human and then lastly structural capital.
8	Asare, Onumah and Simpson (2013)	The Disclosure of Intellectual Capital (ICD) in Ghana: Evidence from Listed Companies in Ghana.	Ghana, content analysis.	The study revealed that the ICD level in annual reports in Ghana is quite high and descriptively reported and though disclosure of IC is improving but at a relatively marginal rate.
9	Matos, Lopes, Rodrigues and Matos (2012)	Investigated the importance of intellectual capital management accreditation as a factor in the organizational development of companies, especially small and medium-sized enterprises (SMEs).	Methodology ICMA – Intellectual Capital Management Accreditation,	It is considered that intellectual capital management accreditation may be a relevant process in the consolidation of an innovative dynamic, which will contribute to the continuous creation of competitive advantages. There are various intellectual capital valuation methodologies, but the research about the effect of the certification and accreditation is still very limited so it is necessary to get more results. However, the methodological research that supported the ICMA system points to the fact of accreditation procedures favouring better management of intellectual capital, thus contributing significantly to improving the organizational performance of accredited companies.
10	Tan, Plowman and Hancock (2007)	The relationship between intellectual capital and financial performance of companies listed in the Singapore Stock Exchange.	Singapore, Value Added Intellectual Coefficient (VAIC) method, intellectual capital, equity, earnings per share and annual return per share.	The results of the study indicated that there is a positive correlation between intellectual capital and the company's future performance.

### III. METHODOLOGY

This section of the paper first identifies and describes the proxies used to represent both the dependent and independent variables. The regression equation is outlined at the latter part of the section. Data were computed from the annual report of the firms of the study for a period of 10 years (2007-2016).

#### 3.1 Research Design

The study used panel data and was based on ex post facto research design. The study was based on ex post facto design because it sought to analyse with the available data, the effect of intellectual capital as a predictive measure of firm's performance. The choice of ex post facto design was also based on the nature of the data used which has the

characteristics of time series. The study used secondary data collected from ten firms in ten years from 2007 to 2016.

#### 3.2 Population of the Study

The population consist of the total number of non-financial firms quoted in the Nigerian Stock Exchange (NSE). The population size of non-financial firms quoted on the Nigerian Stock Exchange amounted to 113.

#### 3.3 Sample size and Sampling Techniques

Sample of twenty-one (21) companies were purposively selected based on availability of the required data. The firms selected are May & Baker Plc, Glaxosmithkline Nig. Plc, Evans Medical Pharmaceutical Plc, Mobil Nig. Plc, Total Nig. Plc, Oando Nig. Plc, Nestle Nig. Plc, Nigerian Bottling Company Ltd, 7-Up Nig. Plc, Unilever Nig. plc, PZ Cussons

Nig. Plc, Vita Foam Plc, Nigerian Breweries Plc, Guinness Nig. Plc, International Breweries Plc, UACN Plc, A. G. Leventis Nig. Plc, Chellarams Nig. Plc, Interlinked Nig. Plc, NCR Nig. Plc, and Chams Nig. Plc.

3.4 Description of the variables

Due to the relative importance of intellectual capital on firm’s performance, the firm’s performance (earnings per share and market to book value) is the dependent variable adopted in this paper.

The Value Added Intellectual Co-efficient (VAIC) methodology developed by Ante Pulic in 1998 formed the underlying measurement basis for the independent variable in this study. It made use of three independent coefficients – Capital Employed Efficiency, Human Capital Efficiency, and Structural Capital Efficiency. According to Pulic (1998), VAIC is an analytical procedure designed to enable management, shareholders and other relevant stakeholders to effectively monitor and evaluate the efficiency of Value Added by a firm’s total resources and each major resource component.

3.5 Model Specification

The model which specifies that firm’s performance (earnings per share and market to book value) is significantly influenced by the intellectual capital indices (Capital Employed Efficiency, Human Capital Efficiency and Structural Capital Efficiency) are formulated as follows:

$$EPS = f(CEE, HCE, SCE) \quad I$$

$$MBV = f(CEE, HCE, SCE) \quad II$$

Where,

EPS = Earnings per Share

MBV = Market to Book Value

CEE = Capital Employed Efficiency

HCE = Human Capital Efficiency

SCE = Structural Capital Efficiency

Table 3.1 Variables Measurement

Variable(s)	Measurements
EPS	= as stated in financial statement
MBV	= market value/book value
CEE	= value added/capital employed
HCE	= value added/human capital
SCE	= structural capital/value added

Note:

- $VA = I + DP + D + T + M + R + WS$  III
- Capital Employed = the book value of a firm’s net assets

- Human Capital = total salary and wage costs of the banks
- Structural Capital =  $VA - HC$  (Pulic, 1998)

Where, VA = value added for the firms; I = interest expenses; DP = depreciation expenses; D = dividends; T = corporate taxes; M = equity of minority shareholders in net income of subsidiaries; R = profit retained for the year and WS = wages and salaries.

The regression equation based on the above functional relational model is stated below:

$$EPS_{it} = \beta_0 + \beta_1 CEE_{it} + \beta_2 HCE_{it} + \beta_3 SCE_{it} + \eta \quad III$$

$$MBV_{it} = \beta_0 + \beta_1 CEE_{it} + \beta_2 HCE_{it} + \beta_3 SCE_{it} + \eta \quad IV$$

Where,

$\beta_0$  = constant

$\beta_1 - \beta_3$  = estimated regression coefficients of equation

$\eta$  = error term

IV. DATA ANALYSIS AND INTERPRETATION

The summary of the analysis result and its corresponding interpretations of the effect of intellectual capital on performance (proxied by earnings per share and market to book value) of non-financial firms in Nigeria are presented below.

4.1 Descriptive Statistics

Table 4.1: Descriptive Statistics

VARIABLES	EPS	MBV	CEE	HCE	SCE
Mean	3.504243	6.546933	0.856014	3.399876	0.614147
Median	1.445000	2.771000	0.668500	3.006450	0.665100
Maximum	71.74000	63.60000	9.678000	28.19200	2.615000
Minimum	-42.74000	-17.50000	-3.532000	-2.546800	-11.23000
Std. Dev.	9.442549	10.30561	1.105581	2.653182	0.920395
Skewness	2.271604	2.236842	3.804586	4.849095	-10.07252
Kurtosis	27.03252	10.11496	31.54035	40.45511	132.4016
Jarque-Bera	5234.274	618.0699	7633.948	13098.22	150067.8
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	735.8910	1374.856	179.7629	713.9739	128.9708
Sum Sq. Dev.	18634.80	22196.98	255.4626	1471.230	177.0495
Observations	210	210	210	210	210

Source: Researcher summary of descriptive statistics (2019)

Table 4.1 above shows the mean (average) for each variable, their maximum values, minimum values, standard deviation. The result provides some insight into the nature of the selected firms’ data used for the study. Firstly, it was observed that over the period under review, the sampled companies have positive average earnings per share of 3.504243, while the mean of market to book value is 6.546933, this means that the selected firms has a positive earnings per share and market to book value (performance) in the period of the study. The table also reveals that a positive average value of 0.856014 for capital employed efficiency (CEE), 3.399876 for human capital efficiency (HCE) and 0.614147 for structural capital

efficiency (SCE) for the selected firms used in the study. These values mean that within the period under review, quoted firms meet up 655% on the average within the period under review. The maximum value of CEE is 9.678000 and its minimum value is -3.532000, maximum value for HCE is 28.19200 and its minimum value is -2.546800; that of SCE is 2.615000, the minimum is -11.23000. The large differences between the maximum and minimum value shows that the firm's data used for the study are homogeneous.

#### 4.2 Correlation Analysis

**Table 4.2:** Correlation Analysis

VARIABLES	EPS	MBV	CEE	HCE	SCE
EPS	1.000000	0.047291	0.189470	0.308169	0.204095
MBV	0.047291	1.000000	0.209361	-0.012392	0.172103
CEE	0.189470	0.209361	1.000000	0.075089	0.075478
HCE	0.308169	-0.012392	0.075089	1.000000	0.171479
SCE	0.204095	0.172103	0.075478	0.171479	1.000000

**Source:** Researcher summary of correlation analysis (2019)

The correlation matrix is to check for multi-colinearity and to explore the association between each explanatory variable and the dependent variable. The findings from the correlation matrix table (table 4.2 above) show that earnings per share (EPS) have a positive association with market to book value (MBV). This justifies the use of both measures as proxy for firm performance. The table shows that earnings per share (EPS) has positively associated with capital employed efficiency (CEE), human capital efficiency (HCE) and structural capital efficiency (SCE); while market to book value (MBV) has a strong positive association with CEE and SCE and negatively associated with HCE. CEE has strong positive association with HCE and SCE. HCE is positively associated with SCE. In checking for multi-colinearity, the study observed that no two explanatory variables were perfectly correlated.

#### 4.3 Regression Analysis

**Table 4.3:** Earnings per Share (EPS) Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.818646	1.138359	-1.597603	0.1117
CEE	1.364228	0.566623	2.407646	0.0169
HCE	0.964014	0.234372	4.113170	0.0001
SCE	1.507933	0.684202	2.203929	0.0286
R-squared	0.743354	Mean dependent var		3.504243
Adjusted R-squared	0.726639	S.D. dependent var		9.442549
S.E. of regression	8.824421	Akaike info criterion		7.216444
Sum squared resid	15963.43	Schwarz criterion		7.296138
Log likelihood	-752.7267	Hannan-Quinn criter.		7.248661
F-statistic	8.576338	Durbin-Watson stat		1.529727
Prob(F-statistic)	0.000002			

The R-squared which is the co-efficient of determination or measure of goodness of fit of the model, tests the explanatory power of the independent variables in any regression model. From our result, the R-squared ( $R^2$ ) is 74% in the Model. This showed that our model displayed a good fit because the  $R^2$  is closer to 100%, these explanatory variables can impact up to 74% out of the expected 100%, leaving the remaining 26% which would be accounted for by other variables outside the models as captured by the error term.

The F-statistics measures the overall significance of the explanatory parameters in the model, and it shows the appropriateness of the model used for the analysis while the probability value means that model is statistically significant

and valid in explaining the outcome of the dependent variables. From table 4.3 above, the calculated value of the f-statistics is 8.576338 and its probabilities are 0.000002 which is less than 0.05. We therefore accept and state that there is a significance relationship between the variables. This means that the parameter estimates are statistically significant in explaining the relationship in the dependent variable.

The t-statistics helps in measuring the individuals' statistical significance of the parameters in the model from the result report. It is observed from table 4.3 above that the three variables (capital employed efficiency, human capital efficiency and structural capital efficiency) were statistically significant at 5% with its values as 2.407646, 4.113170 and



2.203929 respectively. This implies that they have contributed significantly to firm performance at the rate of 5% level of significant.

Our model is free from the problem of autocorrelation because the Durbin-Watson value is 1.529727 which is approximated as 2 (that Means, the absence of autocorrelation in the model used for the analysis).

The a’p priori criteria are determined by the existing accounting theory and states the signs and magnitude of the variables from the result. The three variables (capital employed efficiency, human capital efficiency and structural capital efficiency) have positive sign and its values are 2.407646, 4.113170 and 2.203929 respectively. In the EPS Model, this implies that increase in three variables increase the firm performance by 241%, 411% and 220% respectively.

**Table 4.4:** Market to Book Value (MBV) Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.537973	1.251028	3.627396	0.0004
CEE	1.873602	0.628878	2.979277	0.0032
HCE	-0.217686	0.265235	-0.820731	0.4127
SCE	1.864761	0.764603	2.438862	0.0156
R-squared	0.710438	Mean dependent var		6.546933
Adjusted R-squared	0.705915	S.D. dependent var		10.30561
S.E. of regression	10.00273	Akaike info criterion		7.462458
Sum squared resid	20611.27	Schwarz criterion		7.526212
Log likelihood	-779.5581	Hannan-Quinn criter.		7.488232
F-statistic	5.282817	Durbin-Watson stat		1.502377
Prob(F-statistic)	0.001574			

The R-squared which is the co-efficient of determination or measure of goodness of fit of the model, tests the explanatory power of the independent variables in any regression model. From our result, the R-squared ( $R^2$ ) is 71% in the Model. This showed that our model displayed a good fit because the  $R^2$  is closer to 100%, these explanatory variables can impact up to 71% out of the expected 100%, leaving the remaining 29% which would be accounted for by other variables outside the models as captured by the error term.

The F-statistics measures the overall significance of the explanatory parameters in the model, and it shows the appropriateness of the model used for the analysis while the probability value means that model is statistically significant and valid in explaining the outcome of the dependent variables. From table 4.4 above, the calculated value of the f-statistics is 5.282817 and its probabilities are 0.001574 which is less than 0.05. We therefore accept and state that there is a significance relationship between the variables. This means that the parameter estimates are statistically significant in explaining the relationship in the dependent variable.

The t-statistics helps in measuring the individuals’ statistical significance of the parameters in the model from the result report. It is observed from table 4.4 above that only capital

employed efficiency (CEE) and structural capital efficiency (SCE) were statistically significant at 5% with its values as 2.979277 and 2.438862 respectively. This implies that they have contributed significantly to firm performance at the rate of 5% level of significant. The remaining variable (human capital efficiency with its values as -0.820731) is not statistically significant at 5%.

Our model is free from the problem of autocorrelation because the Durbin-Watson value is 1.502377 which is approximated as 2 (that Means, the absence of autocorrelation in the model used for the analysis).

The a’p priori criteria are determined by the existing accounting theory and states the signs and magnitude of the variables from the result. Capital employed efficiency (CEE) and structural capital efficiency (SCE) has positive sign and their values are 2.979277 and 2.438862 respectively. In the MBV Model, this implies that increase in CEE and SCE increase the firm performance by 298% and 244% respectively. Human capital efficiency (HCE) has negative sign and its values as -0.820731. Therefore in the MBV Model, this implies that decrease in HCE decreases the firm performance by 82%.

#### 4.4 Hypotheses Testing

**H<sub>01</sub>:** Capital employed efficiency does not significantly affect performance of non-financial firms in Nigeria.

**Model 1 (EPS)** From the result of our test in table 4.3 above, we found out that the value of our t-test for capital employed efficiency (CEE) is 2.407646 with a probability of 0.0169. This probability value is less than the desired level of significant of 0.05. We accept the alternative and reject the null hypothesis, which says that capital employed efficiency significantly affect performance of non-financial firms in Nigeria. Thus, capital employed efficiency is positive and has significant impact on performance of non-financial firms in Nigeria at 5% level of significant.

**Model 2 (MBV)** In the result from our test in table 4.4 above, we found out that the value of our t-test for capital employed efficiency (CEE) is 2.979277 with a probability of 0.0032. This probability value is less than the desired level of significant of 0.05. We therefore accept the alternative and reject the null hypothesis, which says that capital employed efficiency significantly affect performance of non-financial firms in Nigeria. Thus, capital employed efficiency is positive and has significant impact on performance of non-financial firms in Nigeria at 5% level of significant.

**H<sub>02</sub>:** Human capital efficiency does not have any significant effect on performance of non-financial firms in Nigeria.

**Model 1 (EPS)** Drawing inference from table 4.3 above, we found out that the computed value, t-value for human capital efficiency is 4.113170, while its probability is 0.0001. Since its probability value is less than the desired level of significance of 0.05. We therefore, reject the null and accept the alternative hypothesis, which says that human capital efficiency has significant effects on performance of non-financial firms in Nigeria. Thus, human capital efficiency is positive and has significant impact on performance of non-financial firms in Nigeria at 5% level of significant.

**Model 2 (MBV)** Drawing inference from table 4.4 above, we found out that the computed value, t-value for human capital efficiency is -0.820731, while its probability is 0.4127. Since its probability value is greater than the desired level of significance of 0.05. We therefore, reject the alternative and accept the null hypothesis, which says that human capital efficiency has no significant effects on performance of non-financial firms in Nigeria. Thus, human capital efficiency is negative and has insignificant impact on performance of non-financial firms in Nigeria at 5% level of significant.

**H<sub>03</sub>:** Structural capital efficiency does not significantly affect performance of non-financial firms in Nigeria.

**Model 1 (EPS)** From the result of our test in table 4.3 above, we found out that the computed value, t-statistics for structural capital efficiency is 2.203929, while its probability is 0.0286. The probability value is less than the desired level of significance of 0.05. We therefore, reject the null and accept the alternative hypothesis, which says that structural capital efficiency has significant effects on performance of

non-financial firms in Nigeria. Thus, structural capital efficiency is positive, and has significant impact on performance of non-financial firms in Nigeria at 5% level of significant.

**Model 2 (MBV)** In the result from our test in table 4.4 above, we found out that the computed value, t-statistics for structural capital efficiency is 2.438862, while its probability is 0.0156. The probability value is less than the desired level of significance of 0.05. We therefore, reject the null and accept the alternative hypothesis, which says that structural capital efficiency has significant effects on performance of non-financial firms in Nigeria. Thus, structural capital efficiency is positive, and has significant impact on performance of non-financial firms in Nigeria at 5% level of significant.

## V. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

### 5.1 Summary of Findings

The study examined the effect of intellectual capital on performance of non-financial firms in Nigeria, and the following were found at the 5% level of significant:

#### Model 1 (EPS):

- I. Capital employed efficiency is positive and has significant impact on performance of non-financial firms in Nigeria.
- II. Human capital efficiency is positive and has significant impact on performance of non-financial firms in Nigeria.
- III. Structural capital efficiency is positive, and has significant impact on performance of non-financial firms in Nigeria.

#### Model 2 (MBV):

- I. Capital employed efficiency is also positive and still has significant impact on performance of non-financial firms in Nigeria.
- II. Human capital efficiency is negative and has insignificant impact on performance of non-financial firms in Nigeria.
- III. Structural capital efficiency is also positive, and still has significant impact on performance of non-financial firms in Nigeria.

In summary, the findings of empirical results based on 2007 – 2016 Nigerian Stock Exchange Fact Book data of twenty-one (21) quoted non-financial firms in Nigeria.

### 5.2 Conclusion

The results of this study supported previous studies like Awan & Saeed (2015), Fathi, Farahmand & Khorasani (2013), and Tan, Plowman and Hancock (2007), on the effect of intellectual capital on performance of non-financial firms in Nigeria. The findings demonstrate that intellectual capital has

statistical significant effect on firm performance proxy by earnings per share and market to book value. Hence, the wealth and growth in today's economy are primarily drawn by intangible (intellectual) assets. The rise of new economy has highlighted the fact that the value created depends far less on their physical asset than on their intangible ones. These assets, often described as intellectual capital, are being recognized as the foundation of individual, organizational and rational competitiveness in the twenty-first century.

The result provides useful information insight for managers, shareholder and policy maker which can aid them in planning and formulating policy that can improve the intellectual capital management there by affecting the performance of firms positively. A well-motivated employee can achieve much with little hence the welfare of the director should be of most importance to shareholding.

### 5.3 Recommendations

The study, therefore recommends the following based on the findings of the study.

- The organization can achieve sustainable value with investment on intellectual capital and with focusing on intellectual capital; they can move from the economy based on the tangible assets towards economy based on the intangible assets.
- The three variables have strong positive effect on firm's performance. The study recommends that organizations should invest on employee's ability, company's internal structure and its external relation with customers. Employees' abilities include their skills, experience and education; while company's internal structure means its administrative policies, procedures and systems.

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