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# Effect of Intellectual Capital on Performance of Firms Listed on Nigeria Stock Exchange

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**Abstract**
This study assesses the effect of intellectual capital on performance of firms listed on Nigeria Stock Exchange. Three specific objectives were formulated to determine the extent to which intellectual capital affects corporate performance. From the specific objectives, hypotheses were also formulated and to test the hypotheses a sample of forty (40) companies were selected from 213 companies listed on Nigeria Stock Exchange using multi-phases sampling method. The study applied Ex-post Facto Research Design and made use of secondary data sourced from annual reports and accounts of sampled firms and Nigeria Stock Exchange Fact Book. Pulic 1998 Value Added Intellectual Capital Co-efficient (VAIC) model which enable the determination of specific effects of the components of intellectual capital (Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE) was adopted and transformed into ordinary least square approach and a multiple regression performed to test the hypotheses at 5% level of significance using E-view statistical software (version 8.0). The analysis of the test shows that Intellectual Capital affects significantly, Company Process measured by ADM/OPA and market to Book value ratio of companies listed on Nigeria Stock Exchange whereas there was no significant effect of Intellectual Capital on Asset Turnover (ATO) . The study therefore recommends among other factors that corporate management should endeavour to provide adequate and conducive working environment, good welfare package reviewing the performance and engaging on regular training and development programmes which will automatically increase the efficiency and productivity of the workforce.
**Keywords:** Intellectual Capital, Firms Performance, Nigerian Stock Exchange.

## 1. INTRODUCTION

During the last two decades, the business environment has progressively moved into a knowledge based, fast changing, technology intensive companies in which investments in human resources, information technology, research and development have become essential in order to strengthen the firms competitive position and ensure their future viability (Canibano, 2000) .

In the twenty-first century firms are competing in a complex and challenging environment and factors like uncertainties and dynamism associated with the development requires knowledge for success (Hih, Keals & Demaris, 1998). Thus, the foundation of organizational competiveness has shifted from an emphasis on physical and tangible resources to knowledge, and managing knowledge- based resources has become the key for sustaining competitive advantage and superior performance (Grant, 1996; Sharkie, 2003).

The new economic system which is popularly known as the knowledge economy or intellectual asset have been recognized as the prominent resource needed for organizational survival. Service organizations like software, finance, pharmaceutical, banking, hotel and universities depend to a considerable extent on their intellectual for revenue drive, while production or manufacturing companies use intellectual capital with its physical assets to sharpen their competitive edge (Firer & William, 2003).

Despite the shift towards human capital intensive economy, traditional accounting has continued to focus more on the physical assets in their financial statements to the exclusion of the more important assets, the intellectual capital (Amstrong, 2006).

As consequence of the above, management is denied of relevant and timely data which enables her to take vital decision regarding her human resources, especially the cost implication of certain decision. Bornemamn (1999) found that enterprises which have managed their intellectual capital better, had achieved stronger competitive advantage than the general enterprises and that companies which had strengthen their own intellectual capital management compared to the others had performed better. Brenman and Connel (2000) posit that intellectual capital management played an important role on the long term business performance of enterprises. To increase the financial performance organizations normally focus on their physical assets without adequate attention on their intellectual capital but .their intellectual capital inefficiency results in a decrease in their financial performance consequently, the desired levels of financial performance are never achieved.

Various research findings have illustrated that intangible asset like knowledge, information, and information technology are prime resources in the knowledge economy. Organization for Economic Cooperation and Development (OECD) (2006) posits that many companies invest in employee training, research and development, customer relations, computer and administrative system. These investments are growing and they

 

are competing with physical and financial investments. Stewart (1997) and Zegha l (2000) describe this change in investment structure due to the rise of knowledge based economy.

Intellectual capital has also been recognized as one of the key determinants of growth today. This applies especially to advanced economics such as Switzerland, United States of America, China and Japan as companies with a large share of unskilled labour have moved to other countries of the world as a consequence of their comparative intellectual capital advantage (Polasek, 2011).

In recent years, companies especially those in the knowledge intensive industry, have experienced a dynamic and competitive environment. Competition at a cross-border scale compels domestic companies to adjust their competitive position by achieving sustainable financial performance. In the knowledge – intensive industries, intellectual capital generally represents the critical resource in the value creation process. Traditional measures of company performance, which are based on conventional accounting principle, are unsuitable to the new economy (Firer & William 2003). Such measures are the main basis for decision making. The conventional performance measurement techniques may lead managers, investors and other stockholders to make inappropriate decision when companies have large portion of their investment in intangible assets.

Mathotia (2000) assert that the issue of valuing and measuring intellectual capital is critical as it enables us to understand where value lies in the firm and for developing measurements for assessing success and growth of the firm. The fact that investors and financial markets attach value to the skills and expertise of Chief Executive Officers (CEO) and other top management can be understood by observing stock prices reaction to changes in management, an element of Intellectual capital not recognized in financial statements as assets. (Lev & Zaowin, 1999; Lev, 2001; Bontis, 2001). This fact therefore question, the reliability and adequacy of traditional accounting methods used by firms in the present information age since it has failed to capture the value of information and knowledge in employee.

There have been some conflicting results on the relevance and relationship between intellectual capital and organizational performance. While some studies on the relationship of intellectual capital and financial performance in some developed nations agree that intellectual capital relates positively and significantly with organizational financial performance and as such accord organizations competitive edge over others (Bornemamn, 1999; Brennan & Conell, 2000; Karnath, 2007 & Ekwe, 2012). Others posit that there are no relationship between intellectual capital and organization performance and physical assets still remain the key determinants of organizational financial performance (Wright & Mcmahan 1995; Gottfredson, 1997 & Jensen, 1998).

The above studies on intellectual capital are carried out in advanced economies. Given the significant contributions of economically emerging nations to the overall development of the global economy. It becomes imperative to carry out an empirical study on developing or emerging economy like Nigeria where despite the shift towards intellectual capital intensive economy, Nigeria firms have continued to use traditional accounting which focuses more on the physical assets on the financial statements and where few spotted studies like Ekwe (2012) , Anuonye (2015) and Onyekwelu (2013) only dealt on financial performance of service oriented firms of (banking, insurance and pharmaceutical sectors respectively of ) the Nigerian economy to ascertain the effect of intellectual capital on performance of firms. Hence, the present study is a modest attempt to examine the effect of intellectual capital on corporate performance of firms in a developing economy using Nigeria as a study base.

### 1.1 Objective of the Study

The broad objective of this study is to determine the effect of intellectual capital on performance of firms, listed on Nigeria Stock Exchange. The Specific Objectives are:

1) To determine the extent to which Intellectual Capital affects Asset Turnover (ATO) of companies listed on Nigeria Stock Exchange.
2) To determine the extent to which Intellectual Capital affects Company Process Administrative Expenses /Operating Assets (ADM/OPA) of companies listed on Nigeria Stock Exchange.
3) To determine the extent to which Intellectual Capital affects the market to book value ratio of companies listed on Nigeria Stock Exchange.

### 1.2 Research Hypotheses

The following research hypotheses will be tested in order to validate the data analysis.

Ho1: Intellectual capital does not significantly affect Asset Turnover of companies listed on Nigeria Stock Exchange.

$Ho_2$: Intellectual capital does not significantly affect Company Process of companies listed on Nigeria Stock Exchange.

$Ho_3$: Intellectual capital does not significantly affect market to book value ratios of firms listed on Nigeria Stock Exchange.

 

## 2. REVIEW OF RELATED LITERATURE

### 2.1 Conceptual Review

#### 2.1.1 Intellectual Capital Concept

The phrase intellectual capital was first proposed by Galbraith in 1969 and popularized by Stewart in fortune magazine where he tried to introduce it as the amount of employees' knowledge and ability which could strengthen the company's competitiveness. Initially, the difference between book value and market value of companies was considered as intellectual capital. Researchers from different background have tried to define specific concepts of intellectual capital in their own words. (Karmath, 2007).

The term intellectual capital includes inventions, ideas, general knowledge, design approaches, computer programmes and publication. Intellectual capital includes all non-tangible or non- physical assets and resources of an organization, as well as its practices, patents and the implicit knowledge of its members and their network of partners and contracts (Shincon, 2005). Stewart (1997) defines it as "Packaged useful knowledge". Sullivan (2000) saw it as knowledge that can be converted into profit. Roos and Roos (1997) state that intellectual capital is sum of knowledge of its members and practical translation of this knowledge into brands, trademarks and processes. Edvinson and Malone (1997) define it as the possession of knowledge, applied experiences, organizational technology, customer's relations and professional skills that provide a company with a competitive edge in the market.

Nahapiet and Ghoshal (1998) define intellectual capital as sum of knowledge and knowing capabilities that can be utilized to give a competitive advantage. Bontis (1998) saw intellectual capital as a collective knowledge embedded in people, organizational routines and network of relationships. Congruent with the above definitions, Youndt and Snell (2004) in their analysis of intellectual capital characteristics, revealed a consensus among scholars that intellectual capital is a multi-dimensional concept that resides at individual level, network and organizations.

Whilst a common definition has not been agreed on, Bontis (1998) and Marr, Schuman and Neely (2003) note that scholars converge on three categories of intellectual capital. Human capital, structural capital and customer capital.

#### 2.1.2 Intellectual Capital and Financial Performance

The impact of intellectual capital on financial performance has not been investigated thoroughly on an empirical level. On a theoretical level, distinguished authors argue that intellectual capital is the value driver of all companies (Stewart, 1997). That knowledge management is a core organizational issue (Nonaka & Takeuchi, 1995) and that organizational knowledge is the crux of every sustainable competitive advantage (Bontis, 1999). On the other hand empirical evidence are inconclusive and far from a solid scientific consensus. The study of Riahi-Belkaou (2003) finds a positive relationship between intellectual capital and financial performance, while Bontis et al (2000) conclude that regardless of industry, the development of structural capital has a positive impact on business performance, on the other hand Firer and Williams (2003) examined the relationship between Intellectual capital and traditional measures of firm performance (Return on Asset and return on equity) and fail to find out any relationship, while Chan et al (2005) using the same methodology conclude that intellectual capital has significant impact on profitability. The following variables that will be used to proxy financial performance in the present study are as follows

(i) **Asset Turnover (ATO):** it is the ratio of total turnover to total asset. It indicates the company's productivity as measured by the asset-turnover ratio.

$$\text{ATO} = \frac{\text{Total Turnover}}{\text{Total Asset}}$$

(ii) **Company Process:** This includes the totality of the internal operations the company undertakes to meet customers' expectations and the technology used in value creation. The following indicators as suggested by Edvinssion and Malone (1997) indicate the process focus of the organization. Company process is = $\frac{\text{Administrative expenses}}{\text{Operating Asset}}$

The primary goal of a firm should be to maximize the value of prices of a firms stock. The success or failure of management decision can be evaluated to the light of the impact of firm's stock price (Remi, 2005). The firm stock price has direct purview to the management efficiency which is one of the signals of firm's performance.

#### 2.1.3 Intellectual Capital and Market Value

According to the traditional accounting practices the book value of an organization is solely calculated from its financial statements. The simplistic method of such a calculation includes subtracting liabilities from the firms' total assets. As a result conservative accounting practices failed to account on the most important intangible assets of every organization (Sveiby, 2000). The gradual introduction of the international accounting standards (IAS) in nearly every developed and developing country (Except for the USA which is expected to implement the IAS in the next five years) forced companies to calculate assets at their real market value, while giving full

 

definitions and credit to all intangible (International Financial Reporting Standard (IFRS), 2008).

Despite that the inability of most companies to comply with IAS and the significant cost of such an implementation, still deteriorate the recognition of the intangible assets of every organization (Judge & Pinsker, 2010). The result of such a short seeing is a growing divergence between the market and book value of organizations. In other words, the market estimates the value of companies with high intangible assets to be significantly higher than the calculated book value (Chen et al 2005, Firer and Williams, 2003; Riahi- Balkooui, 2003).

In this study the difference between market value and book value of the company is used to measure shareholders value creation in capital market and market to book ratio is used as a measure of shareholders value creation of sample companies. It is ratio of market value of common stock and book value of total shareholders' equity.

$$\text{M/B Ratio} = \frac{\textbf{Market Value of common stocks}}{\textbf{Book value of shareholder equity}}$$

**2.2 Empirical Review**

At present, knowledge, information and information technology, whether embodied in human resources or organizational structure, have become primary production factors. Manufacturing or producing companies use these vital assets to gain superior competitive advantage. But in service companies belonging to sector like Information Technology (IT) banking and finance, pharmaceuticals etc, intellectual resources are the main basis of enhancing sales revenue and profitability also. They use intellectual resource as a capital to their production system. According to Bornemanne et al (1999) enterprises, which are able to manage their intellectual capital will achieve stronger competitive advantage than other competing enterprises. Brennem and Connell (2000) claim that intellectual capital management plays an important role in achieving long-run business performance of an enterprises

The empirical works related to this study are reviewed based on the objectives of the study.productivity and market value of a firm by employing the Value Added Intellectual Coefficient (VAIC) technique reviewing the intellectual capital components, he suggests measure that are of importance for improving a firms efficiency and resources in the united kingdom.

In an empirical study of intellectual capital performance and its impact on the financial performance of Pakistani insurance companies

Rehman, Ilyas and Rehman (2011) found that human capital efficiency HCE) plays a significant role in intellectual capital performance of both life and non-life insurance sectors of Pakistan. They conclude that an insurance company with a high HCE and SCE naturally will have a better financial performance.

Using the VAIC model, Jovornike, Tekavlie and Mac (2012) study more than 2000 Slovenian companies between 1995 and 2008 and found a high degree of correspondence between the improvement in the rank of a company's intellectual capital investment efficiency and the improvement in rank of its financial performance in per group

Clarke, Seng and Whiting (2010) using Pulic's VAIC examine the effect of intellectual capital on firm's performance in Australian listed companies between 2004 and 2008. The results suggest that there is a direct relationship between intellectual capital and the performance of Australian publicly listed firms, particularly with capital employed efficiency and to lesser extent, human capital efficiency.

Using the balanced score card (BSC) strategy Bose and Keith (2007) examine the development of a frame work for the measurement of an organization's performance. Measuring performance in relation to a major Australian company, they studied on the nearly appointed CEO of the fosters' Brewing Group reversed a decline in performance by adopting, among other initiative, the balance scorecard approach to management and turned the organization's fortunes around.

Chan (2009) have carried out a study in companies enlisted in the Hongkong Stock Exchanged and it reveals that there is no significant association between intellectual capital and corporate performance using ATO and ROE. The result shows that physical capital is the most significant factor affecting profitability, productivity and market valuation of the firms.

Chu, Chan and Wong (2011) examine the association of intellectual capital with financial performance of companies operating in Hongkong Stock Exchange during 2005-2008. VAIC methodology was applied to measure intellectual capital and Asset Turnover. The result found no strong association between VAIC and ATO.

Ahangar (2011) study the relation between IC and financial performance. An empirical investigation in Iranian companies between 1980 -2009. The results showed that the relationship between the performance of a company IC and profitability, employee productivity and growth in sales are informative. In addition suggests that the performance of a Company intellectual capital can explain profitability and productivity.

Diez, Majda, Begona and Alice (2010) have tried to examine the influence of intellectual capital (represented by human capital and structural capital on the creation of business value of Spanish firms having 25

 

employees or more. The explanatory analysis confirms the positive relationship between the use of human and structural capital and value creation measured by sales growth. The study however, finds no significant relationship among human capital structural capital and dependent variables like return on assets and productivity.

Tseng and Goo (2005) prove that the role of intellectual capital in enhancing corporate value of High-tech companies is more than for the non-high-tech companies. Innovation and relationship capital impact directly and positively to corporate value measured by market-to-book value. Ghose and Wu (2007) use both secondary and survey data to examine the effect on intellectual capital on firm value measured by market to Book ratio and Tobin's Q. Result show that intellectual capital explains the financial performance of the sample companies.

Cheuck, Wong and Kok (2006) examine the relationship using data from 52 public finance companies from the Bursa Malaysia. Their study examines the market value which is denoted by share prices. The results show that the correlation between VAIC and share price is negative.

Maheram, Muhammad and Ishmael (2009) examine the efficiency level of the trend of IC among 18 financial companies for the year 2002-2006 they have found that firms' market value have been created more by capital employed (Physical and financial) rather than intellectual capital. However, there is no evidence of IC efficiency by years. In terms of relationship between VAIC and their companies, IC has positive and significant relationship with Human capital and Structural capital but not with the capital employed.

Bramhandker, Erickson and Applebee (2007) have study the relationship of intellectual capital with the organization's financial performance, using a sample of 139 firms in the drug industry of USA. Samples companies have been sorted according to intellectual capital value calculated by differentiating book value from market capitalization. From the study results it is revealed that firms with the highest level of intangible assets perform better than those with lower levels. The high lever firms are seen to have earned significantly better returns and significantly less variability in stock price.

Wang (2008) investigates the relationship between intellectual capital and market value of United States S & P 500 publicly traded companies. The researcher has used secondary data of 893 United States electronic companies for the study. Multiple Linear regression techniques has been used to analyzed the data. The results reveal that the intellectual capital had strong impact on the competitive advantage and market capitalization of the firm.

Asadi (2012) investigates the relationship between intellectual capital and value creation criteria of 59 companies listed on Tehran Stock Exchange for a period of five years. The results indicate that there are significant relationship between intellectual capital and economic value added, cash value added and market value added.

**2.2.1 Empirical Review Based on Studies in Nigeria.**

Despite the prominence given to the efforts of the workforce in the annual financial statements of companies in Nigeria, the measurement of intellectual capital in Nigeria is very shallow. It is true that human capital is acknowledge by the treatments of companies especially if the chairman's statement in the annual reports, yet such knowledge are not measured or articulated in the company's financial reports. This means that the value of firms in Nigeria is under reported.

In Nigeria, studies on the measurement of intellectual capital are currently not detailed.

Onafalujo Eke and Akinlabi (2011) observe though that accounting in insurance companies using the new IFRS recommendation is relevant to the Nigerian Financial environment but argue that the application of IFRS through the use of observable and unobservable market inputs as well as the experience variance of operators may be difficult in the short run but achievable in the long run. They identified that the inability of the workforce to uphold good ethical practices in insurance firms in Nigeria do negatively affect the practice of insurance.

Epetimelim and Ekundago (2011) observe that intellectual capital as a vital corporate asset, will net away unless companies do something to stop the brain drain and to retain critical knowledge. They opined that the survival of the insurance companies in Nigerian is dependent upon the resolve of the workforce to eliminate unethical practices which are resorted to avoiding liability under insurance policies.

Oneyekwelu and Ubesie (2013) study on pharmaceutical companies in Nigeria, analyzed the effect of intellectual capital on corporate valuation from (2004-2013) using market to book value ratio (MV/BV) and earnings per share (EPS) adopting Pulic (2000) VAIC, the results show that human capital efficiency has a positive and significant effect on market/book value. Structural capital has a negative and insignificant effect on EPS. While Ekwe (2012) found out a statistically strong relationship between the components of intellectual capital and market to book value M/BV ratio of banks listed on Nigeria Stock Exchange.

Yahaya (2006) using the quantitative measure published by the Institute of Intellectual Capital Research and approved by the Saratoga Institute measured the impact of investment in human training and development on employees effectiveness in Nigerian Banks between 2001 and 2005. Her study confirms that an assessment of the human resource effectiveness of 3 commercial banks (Zenith, First bank and Union bank) showed that Zenith bank with the best human resources management and accounting practice perfumed better than first bank and

 

Union Ba

**2.3 Summary of Reviewed Literature**

A critical assessment of the materials reviewed in this study reveals that over four decades ago, intellectual capital research, became the focus of accounting research. The phrase intellectual capital was first proposed by Galbraith (1969) and popularized by Stewart (1997) in fortune magazine. The increasing gaps between market value and book value have drawn attention among researchers to find contribution of intellectual capital to the organization financial performance. The justification or otherwise for the place of knowledge otherwise called intellectual capital in driving market value, and indeed other corporate value indices has constituted a challenging academic problem in the past few decades. Some scholars have described intellectual capital as being a key driver of corporate value enhancement (Sullivan, 2000; Firer & William. 2003; Amitava, 2014).

In contrast to the above submission some empirical studies could not establish any statistical relationship between intellectual capital and firms value (Zou & Huen, 2011).

Great research work has been carried out in advanced economics, studies like Bontis et al (2000) ZLang et al( 2006), Riahi- Belkaui (2003) and others as sported in the reviewed literature.

In Nigeria the few works sported which did not take a holistic approach in determining the effect of intellectual capital on firms listed on Nigeria Stock Exchange are: Ekwe (2012) who studied on few selected banks, Anuonye (2015) who investigated on the insurance sector and Onyekwelu (2013) who carried a study on the pharmaceutical sector of the Nigeria economy.

**2.4 Research Gap**:

From the summary of the reviewed literatures and to the best of my knowledge it is clear that researchers in Nigeria have not attempted to carry out an empirical study of intellectual capital on all the firms listed on Nigeria Stock Exchange . The few sported decomposed the Stock Exchange Market into sectors. Ekwe (2012) based his research on the banking sector, Anuonye (2015) considered the insurance sector while Onyekwelu (2013) investigates the pharmaceutical sector of the Nigerian economy. Hence this present study is a modest attempt to close the gap by studying all the sectors and firms listed on Nigeria Stock Exchange.

**3. METHODOLOGY**

**3.1 Research Design**

The study adopted ex-post facto research design in order to establish the extent to which intellectual capital affects firm's performances. In such research design, the research is undertaken after the events have taken place and the (Historic) data are already in existence it is a systematic empirical study in which the researcher does not in any where control or manipulate independent variable because the situation for study already exists or has already taken place (Asika, 1990). An ex-post facto research determines the cause – effect relationship among variables (Onwumere, 2005). This study is interested in determining the effect of intellectual capital on firms' performance.

**3.2 Population of Study**

The study population consists of all the 213 listed companies on the Nigeria Stock Exchange. (The Nigerian Stock Exchange Fact Book, 2001)

**3.3 Sample and Sampling Techniques**

The study focused on 213 companies listed on the Nigeria stock exchange during the period 2001 to 2015. Sample size was reduced to 40 companies out of 213 because of, Merger and acquisition, distress and delisting of some companies on the Nigerian Stock Exchange Market. Panel data will be used to overcome the problems associated with missing data (Negash, 2005). The panel data of 40 companies over a period of 15 years will result to 600 observations.

The study employed multi-phase sample method. In multi- phase sampling method some of the same different sampling units are employed at the different phases of sampling. Multi-phase sampling is a sampling method in which certain items of information are drawn from the whole unit of a sample and certain other items of information are taken from the subsample (Philip and felted, 1990)

We also excluded companies which have access for the first time during the selected period. In details 45 companies excluding 5 due to their two short listing periods were selected.

**3.4 Sources of Data**

This study will apply secondary data which will include data for financial performance proxy by Return on Asset, Return on Equity, Asset Turnover, Company Process, Employee Productivity will be collected from published annual reports of the respective firms while market related data will be collected from annual reports and Nigeria

 

Stock Exchange Fact Book.

### 3.5 Method of Data Analysis

To analyze the respective effects of intellectual capital and firms performance multiple regressions analyses will be performed based on the model specified below.

In assessing the effect of intellectual capital on firm's performance, the variables included in the regression model will be examined with P-values related to them.

P - Value represents the minimal level to which the null hypothesis of no statistical significance of the variable evaluated into the model would be rejected. Panel data will be used in the study for test of the six hypotheses. This is the combination of the time series with cross sectional to enhance the quantity and quality of data in ways that would be impossible using only one of these two dimensions. (Gajurati, 2003).

The repeated observations of enough cross-section and panel analysis permit, the study of dynamics of change with short time series. We test the significance of the variables at 5% level of significance. According to this approach a variable is assumed to be significant (Consequently rejecting the null hypothesis) if its P-value is less than 5% significant level.

Researchers often investigate value of different samples by comparing $R^2$ which expresses the explanatory power of a regression model. $R^2$ in statistical terms expresses the fraction of the variation in the independent variables by the regression (Gottoche & Schauer, 2011). However, in multiple regression an adjusted measure of ($R^2$ Adjusted) is needed .The reason is that $R^2$ values grow up any way whether a new variable is added into the model even if the new variable does not improve the model (Gottoche & Schauer, 2011)

Standardized regression co-efficient are also presented to judge the predictive strength of independent and control variables (Veaux, Velleman & Bock 2003).

Variation Inflation Factors (VIF) values are reported to check the problems of multicolinearity. Collinearity is considered as serious if the variation inflation factor is greater than 5 (Chan 2009).

Regression results of intellectual capital and corporate performance of all 40 sample companies are discussed using both VAIC and decomposed elements of VAIC (HCE, SCE, and CEE).

### 3.6 Model Specification

A lot of models have been developed by intellectual capital researchers as reviewed in chapter two of this study. The present work is based on Pulic (1998) model, the Value Added Intellectual Co-efficient (VAIC) model transformed into an ordinary least square (OLS) regression approach.

VAIC was developed basically as an analytical tool designed to effectively monitor and evaluate the efficiency of value added by a company's total resources among each resources components (Pulic 1998). The method is relatively simple and proposes a quantitative approach that uses accounting information and produces efficiency indicators which are comparable among companies within the industries. This makes the approach popular. The procedure for calculating VAIC starts from determining the company's ability to create value added (VA). According to this method Value Added is the difference between sales output and input.

Step 1: VA = Output - Input

Where output refers to the sale revenue which the companies earn by selling all the products and service in the market in a particular time period. Input on the other hand comprises all the expenses incurred in earning the above revenue except employee costs.

Pulic (1998) states that the higher the VAIC, the better the efficiency of value added (VA) by a firms total resources.

Algebraically VA = I + DP + D+T + M+R+WS

**Where** VA = Value Added
I = Interest expenses
Dp = Depreciation expense
D = Dividend
T = Corporate Tax
M = Minority Shareholders interest
R = Profit retained for the year
Ws = Wages and salaries

Alternatively, VA can be calculated by deducting operating expense (Material costs, maintenance costs, other external costs) from operating revenue (Pulic 1998)

**STEP 1:** VAIC is the sum of two indicators: Capital employed efficiency (CEE) and intellectual capital efficiency (ICE)

VAIC = CEE + ICE

Intellectual capital efficiency is made up of human capital efficiency (HCE) and structural capital efficiency

 

(SCE)
VAIC = CEE + HCE + SCE
VAIC = Value added intellectual Co efficiency
CEE = Capital employed efficiency of the companies
HCE = Human capital efficiency of the companies
SCE = Structural capital efficiency of the companies
**STEP 2:** Calculation of the components of value Added Intellectual Co efficient.
CEE = VA /CE
CEE = Capital Employed Efficiency co-efficiency of the companies
VA = Value added on the companies
CE = Book value of the net assets of the companies
**STEP 3:** Calculation of Human Capital. Pulic (1998) argues that total salaries and wage cost are part of human capital. Human capital efficiency therefore is calculated as the ratio of total value added divided by total salaries and wages
HCE = VA/HC
HCE = Human Capital efficiency of the companies.
VA = Value Added
HC= Human Capital (Total Salaries and wages )
In order to calculate structural capital efficiency (SCE) it is first necessary to determine the value of a firm's structural capital.
**STEP 4:** Calculation of Structural Capital
Structural capital is a firm Value Added (VA) less its human capital (EKwe 2012; Pulic, 1998)
SC = VA - HC
Where SC = Structural Capital
VA = Value Added
HC = (Human Capital) which is total salaries and wages of the companies.
Pulic (1998) argues that there is a proportionate inverse relationship between Human Capital and Structural Capital 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. Hence, the formula for calculating structural capital efficiency (SCE) differs from that of CEE and HCE. Pulic (1998) states that SCE is the ratio of a firm's SC divided by the total value added
SCE = SC/VA
Where SCE = Structural capital
Efficiency Co-efficiency of the companies
SC = Structural capital of the companies
VA = Value added of the companies.
This model is so unique from the other models discussed in the reviewed literature in that it has gained popularity among intellectual capital researchers to measure intellectual ability of the companies. (Chan, 2009; Schneider, 1999; Goh, 2005) among others support the adoption of this model based on the following reasons.

1) It produces objective and quantitative measurement without the requirement of subjective grading or use of questionnaires.
2) It aids further computation and statistical analysis by using a large sample size that may run into thousands of data items collected over a period of time.
3) It makes use of published financial data so that it may enhance the reliability of the measurement.
4) It uses very simple and straight forward procedures in its computations.

This model (VAIC) will be stated in mathematical form

$$\boldsymbol{ATO_{it}} = B_O + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it}$$

$$\boldsymbol{CP_{it}} = B_O + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it}$$

$$\boldsymbol{M/B_{it}} = B_O + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it}$$

From the above deterministic model. The following multiple regression model are derived to test hypothesis 1- 3

$$ATO_{it} = B_O + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it} + e_{it}$$

$$CP_{it} = B_O + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it} + eit$$

$$M/B_{it} = BO + B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 LEV_{it} + B_5 PC_{it} + B_6 SIZE_{it} + e_{it}$$

ATO = Asset Turnover as measured by $\frac{\text{Turnover}}{\text{Total Assets}}$
CP = measured by $\frac{\text{Administrative Expenses}}{\text{Operating Assets}}$ indicates internal business process efficiency
M/B = Market value to book value ratio
HCE = Human capital efficiency indicate human capital performance as measured by the ratio of the value

 

added to intellectual capital.
SCE = Structural capital efficiency indicates structural capital performance as measured by the Ratio of Structural Capital to value Added.
CEE = Capital employed efficiency indicates performance as measured by the ratio of value added to capital employed.
PC = Physical capital intensity as measured by fixed assets divided by total assets.
LEV = Debt to equity ratio this indicates the risk profile of the company as measured by the debt equity ratio.
**Size**: Size of the firm as measured by natural log of total assets.
BO = Constant term
$B_1$ to $B_6$ = Coefficients to be estimated
E = Error term
It= Individual firm at time t
**Decision Rule:** A variable is assumed to be significant consequently rejecting the null hypothesis if its P-value is less than 5% significant level

### 4.0 Data Presentation
The data used is as in appendix 1 from were table 4.1 was derived.

### 4.1: Data Analysis
#### 4.1.1 Descriptive Statistics
Descriptive statistics of dependent, independent and control variables of 40 sample companies are shown on table 4:2. The mean value of VAIC 3.26 indicates that sample companies are considerably effective in generating values from their intellectual base. The table further reveals that the three components of VAIC. That is

**Table 1 Descriptive statistics of sampled companies**

| | Minimum | Maximum | Mean N =40 | SD (δ ) |
|---|---|---|---|---|
| VAIC | 4.201000 | 9.969000 | 3.262557 | 2.141838 |
| HCE | 4.87000 | 3.307000 | 4.574135 | 8.133633 |
| SCE | 1.260000 | 6.496000 | 3.293180 | 1.654167 |
| CEE | 4280100 | 7.920000 | 1.862634 | 2.286310 |
| ROA | 7.070000 | 19.70400 | 0.140200 | 4.644494 |
| ROE | 2.573000 | 16.18200 | 0.666609 | 3.496472 |
| ATO | 0.650000 | 5.420100 | 1.65127 | 1.539158 |
| ADMOPA | 15.55000 | 5.200000 | 0.417120 | 1.361767 |
| EMP | 5.084697 | 2.310008 | 0.2386307 | 6.2728525 |
| MB | 3.680000 | 10.23000 | 0.831481 | 2.748146 |
| LEV | 1.478000 | 6.539000 | 3.334677 | 1.763257 |
| PC | 9.997704 | 9.997704 | 8.689929 | 2.539781 |
| TA | 6.610009 | 6.610009 | 7.290008 | 1.670009 |

**Sources: Researcher's computation via E-view**

HCE, SCE and CEE have respective mean values of 4.47, 3.29 and 1.86 respectively. From this it is apparent that the human capital is most effective in the matter of value creation than structural capital and capital employed during the study period.

The financial performance of sample companies is not too bad because the average profitability using ROA and ROE are 14% and 66% respectively while their ATO and M/B are 1.66% and 83% during this study period. Company process and employee productivity have 41% and 24%. From the above analysis it is obvious that economic performance of sample companies is sound.

### 4.2 Test of Hypotheses
$HO_1$ The of hypotheses one Intellectual capital does not significantly affect Asset Turnover (ATO) of companies listed on Nigeria Stock Exchange.

The statistical result of model one are shown in the table 4.1A the results of the regression coefficients for explanatory variables (VAIC) and Asset turnover (ATO) ratio as dependent variable are presented here. Table 4.1A presents the results with VAIC and table 4.1B shows the result considering components of VAIC. From the statistical result it is seen that adjusted R2 is 0.04 in table 4.1A and 0.146 in table 4.1B. These numbers indicates that the model is able to explain 4% and 14% of the variance in both cases.

In addition VAIC has a positive (0.08) association but insignificantly affect ATO having a P-value of 0.69.

 

Decomposing VAIC to single out intellectual capital since VAIC includes capital employed table 4.1B reveals that HCE has a positive association with ATO while SCE and CEE have negative effect on ATO. The two components of intellectual capital HCE and SCE negatively and insignificantly affect ATO.

**Decision:** Since the P-values of HCE and SCE are 0.7 and 0.52 which are greater than 5% significant level. Hypothesis three which states that intellectual capital does not significantly affects asset turnover (ATO) is hereby accepted.

**Test of Hypothesis Two**

**$HO_2$**: Intellectual capital does not significantly affect company process (ADM/OPA) of companies listed on Nigeria Stock Exchange.

The tables 4.2A indicate that VAIC explains 72.9% of the variance in administrative process proxy by ADM/OPA. While in table 4.2B a similar result is witness where 76.5% of the variance of ADM/OPA is explains or as a result of components of VAIC.

VAIC in table 4.2B has a positive association with ADM/OPA having 0.257 Beta co-efficient and significantly affects company process with a P-value of 0.037 which is less than 5% significant level.

Using table 4.2B to test our hypothesis four which states that intellectual capital does not significantly affects company process. It can be seen in the table that the components of intellectual capital HCE and SCE are positively associated with company process. This is because a unit naira change in HCE and SCE result to 2.66 and 2.37 change respectively in ADM/OPA. Both HCE and SCE significantly affect company process having a p-value of 0.041 and 0.012 respectively. The study result does not support the hypothesis four which states that intellectual capital does not significantly affect company process.

The result of VAIC and log of employee productivity in table 4.3A shows that VAIC is negatively and insignificantly affects employee productivity.

Considering the components of Intellectual Capital HCE and SCE in table 4.3B. The result also corroborates the result in table 4.3A in that they all have negative effects and insignificant.

**Test of Hypothesis Three**

$HO_3$: Intellectual capital does not significantly affect market to Book Value ratio (M/B) of companies listed on Nigeria Stock Exchange Market.

The relationship between VAIC and market to Book-value Ratio (M/B) of the companies listed on Nigeria stock exchange reveals that VAIC explains 8% of the variance in the dependant variable (M/B). Having a P-value of 0.038 which is less than 5% significant level.

VAIC has its components HCE, SCE and CEE. In order to single out the effect of intellectual capital on M/B, HCE and SCE are considered in table 4.4B

HCE and SCE explains 23.5% and 31.6% respectively of the changes in market to Book value Ratios (M/B) and significantly affects M/B since their P-value are 0.043 and 0.039 respectively. This figures are less than 5% significant level and therefore disagrees with hypothesis six which states that intellectual capital does not significantly affect market to BOOK value M/B ratio

## 5.0 Policy Implication of Findings

Several implications can be drawn from the findings for industry captains as well as policy makers in government of Nigeria and development nations as well.

(1) The government of Nigeria should realize that for Nigeria to attain the desired vision of being one of the strongest twenty economics of the world, the must be a radical transformation and development of intellectual capital base. Strong Nations of the world such as United States of America (USA) Japan and China attained such feats because of their level of investment and development of their intellectual capital base.

(2) Education: Human capital is critical for the success of firms in all industry. These findings do not only call for a review of the training and educational upliftment in companies where they fell short but also calls for a review of the educational policies and standards to encourage public. Private partnership in training of high quality human capital. Beyond having adequate high quality human capital, human capital becomes ineffective if it operates in poorly resourced environment (Bontis, 2002).

(3) Another policy implication of these findings is that stock market in Nigeria needs complementary reports on intellectual capital since information on intellectual capital are not yet included in annual financial reports of companies in Nigeria and in most countries in the world.

## 5.2 Conclusion

The use of information and information technology in business management has led to the rise of knowledge economics. In this new economy, knowledge intensive companies have gained competitive advantages over others. Intellectual capital is considered as the main value driver and plays an important role in enhancing corporate performance.

 

The study finds out that besides the use of traditional indices, intellectual capital can also be used to evaluate firms performance. The rise of intellectual capital is inevitable, given the technological focuses that are sweeping across the globe. Intellectual capital will soon dominate the methods of appraising companies performance and valuation, because it captures the dynamics of organizational sustainability and recognizes that in modern companies everything is dependent on talents, dedication of staff (human capital) and quality of tools (structural capital) as evidenced in the results of the analysis which indicated that both HCE and SCE showed a significant and positive effect on corporate performance.

**Reference**

Ahanger, R.G. (2011). The relationship between intellectual capital and financial performance: An empirical investigation in an Iranian company. *African Journal of Business management Vol 5(1) PP 88-95,.*

Amitava, L. (2004). *Effectiveness of investment in intellectual capital: Evidence from Indian knowledge - based companies.*

Baibarina, E.R. & Golovko T.V. (2008). Empirical investigation of intellectual enterprise value and its factors for big Russian companies. *Corporate Finance Journal vol. 2 No. 6 pp 5 – 23*

Barney, J. (1991). Firms resources and sustained competitive advantage. *Journal of Management No 17, 771-792*

Beaver, W.H. (2002). Perspective on recent capital market research. A*ccounting Review.*

Cabrita, M. & Vaz J. (2006). Intellectual capital and value creation: Evidence from the Portuguese banking industry. *The Electronic Journal of Knowledge Management vol. 4 No.1, PP 11-20*

Cabrita, R. & Bontis N. (2008). Intellectual capital and business performance in Portuguese banking industry. *International Journal of Technology Management, No.43, PP 212-237*

Canibano, Garcia, M. and Sanchez, P. (2000). Accounting for intangibles: A Literature Review. *Journal of Accounting Literature No.19 PP 102-130*

*Diez, M.J., Magda, L.M. Begona, P.Alicia, S. (2010).Intellectual capital and value creation in Spanish firms. Journal of Intellectual Capital vol.11No.3PP.348-367.*

Darush, F. & Mohammad, A*. (2013).*The assessment of intellectual capital efficiency on performance efficiency of listed companies on Tehran Stock Exchange*. International Journal of accounting and Finance Management vol.16*

Edvinsson, L. (2000). Some perspectives on intangible and intellectual capital. *Journal of Intellectual capital vol. No.1 PP 12-16*

Edvinssen, L. Malone M (1997). *Intellectual capital: The proven way to establish your company's real value by measuring its Hidden Brain power.* London Judy Piakus.

Edvinsson, L. & Sullivan, P. (1996). Developing a model for managing intellectual capital. *European Management Journal vol. 14 No.4, PP 356 – 364.*

Firer, S. & Stainbank, (2003). Testing the relationship between intellectual capital and a company's performance. Evidence from South Africa. *Meditari Accounting Research Vol. 11 PP 25-44*

Firer, S. & Williams, S.M. (2003). Intellectual capital and traditional measures of corporate Performance. *Journal of Intellectual capital vol 4 No.3 PP. 348 – 360.*

Galabova, L. & Guy, A. (2011). Is intellectual capital - based strategy, market based or resource- based? On sustainable strategy in a knowledge -based economy. *Journal of*

Gujarati, D. (2003). *Basic Economics*. 4th ed McGraw Hill New York.

Guthrie, J. & Pelty, R. (2000). Intellectual capital: Australian annual reporting practices. *Journal of Intellectual Capital vol 9 No.1 PP. 241- 251*

Guthrie, J.P., Datta, D.K. & Wright A.M (2004). *Feeling back the onion competitive advantage through people. Test of casual model*. CARS Working paper 04 -09

Hall, R. (1992).The strategy analysis of intangible resources. Strategic Management Journal, vol.13, No 2, PP 135-144.

IFRS, (2008). International Financial Report Standard

Inta, K. (2015). Evaluating the importance of financial and non financial indicators for the evaluation of companies performance. *Management Theory and studies for rural Business and infrastructural Development. Vol.37 No.1 PP 80-94*

Johnson, L.D., Neave, E.H. and Pazderky, B. (2001). *Knowledge, innovation and share value* (Framework paper -01-11), Kingston Queen's University)

Kamath, G.B. (2010). The intellectual capital performance of banking sector in Pakistan. *Pakistan Journals of Communications & Social Sciences vol. 4 No. 1 PP 84-99*

Lev, B. (2001). *Intangibles Management and reporting.Washington,* De Brookings Institution Press.

Lev, B. & Redhkrishmans, (2003). *The measurement of firms specific organization capital,* NBER working paper, no 9851 retried from http://www.nber.org/pape*rs/w9581.htm*

 

Lev. B. & Socgianns, T. (1996).The capitalization, amortization, and value relevance of R & D. *Journal of accounting and economics, 21 PP 107-138*

Lelv, B. & Zambon, S. (2003). Intangibles and Intellectual capital: An introduction to a special issue. *European Accounting Review, vol.12 No 4, PP 597 -603.*

Lev, B. & Zarowin, P. (1999). The boundaries of financial reporting and how to extend them. *Journal of Accounting Research Vol 27 No.2,PP 353-385.*

Luthy, D.H. (1998). *Intellectual capital and its measurement.* College of Business, utah state university, Lojan, Utah.

Luthy, D.H. (1998). *Intellectual capital and its measurement,* A paper presented at the proceedings of the Asian Pacific interdisciplinary research in accounting conference (APIRA) Osaka, Japam

Lowendahl, B. (1997). Strategic management of professional service firms. *Handelshojskolens Forlay, coperhagar*

Maditinos, D., Dimitrios, C., Charalampost, Georgios, T. (2011). The impact of intellectual capital on firms market value and finanical performance. *MIBES transactions VoL 5 Issue 1No.58– 72.*

Maheram, N., Muhammad, N., Ismael, M. (2008). Intellectual capital efficiency and firms performance: Study on Malaysian. Financial sectors. *International Journal of Economics and Finance vol. 1 No.2 PP 206-212.*

Mahammad, N.M., Ismael, N. & Isa F.M. (2006). *Intellectual capital efficiency level of Malaysian financial sector;* Panel data analysis (2002-2006). Universities Technology Mara and University Utara Malaysia.

Makki, M.M., Roshi, S.A. & Rahman, R., (2005). Intellectual capital performance of Pakistani Listed corporate sector. *Internal Journal of Business and Management, vol. 3 No.10 PP 45-51.*

Makia, M.A. & Lodhi, S.A. (2009). Impact of intellectual capital on return on investment in Pakistani corporate sector, *Australian Journal of Basic Applied Science vol. 3 No.3 PP 2959- 2007.*

Marr, B. (2004). Measuring & Bench- marking intellectual capital. *Journal of Intellectual Capital vol. 11 No.6 PP 559- 570*

Marr, B. Schiuma, G. & Needy, A. (2003). *The dynamic of value creation mapping. Your intellectual performance drivers.* The centre for business performance, Crandfield School of Management Unpublished.

Mayo, A. (2000). The role of employee development in the growth of intellectual capital. *Personal Review vol. 29 No 4 PP. 521-333*

MCEroy, M.W. (2002). Social innovation capital, *Journal of Intellectual Capital vol 3 No. 1 PP. 30 - 39.*

Mondal, A. & Ghosh, S.K. (2012). Intellectual capital and financial performance of Indian Banks, *Journal of Intellectual Capital vol.13 No.4 PP. 515 – 530*

Mouritsen, J. (1998). Driving growth economic value added versus Intellectual capital. *Journal of Management Accounting Research vol.12 No5 PP. 123-152*

Mouritsen, (2003). Intellectual capital and the capital market. *Accounting, Auditing and accountability Journal 16 (1) PP 18-30*

Mouristsen, J. Larsen. H.T. & Bakh, A.N., (2001). Intellectual capital and the capable firm: Narrating, visualizing and numbering for managing knowledge. *Accounting Organization and Society vol. 26 No.7 PP 735 – 762.*

Naji, B. (2005) An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance in context of commercial banks of Bangladesh. Received from *http://www.sb.lab.edu .b.d/internship/autum 2005.022175 pd.*

Najibullah, S. (2005). An empirical investigation of the relationship Between intellectual capital and firms market value and financial performance. Independent University, Bangladesh. Received from *http://www.sb.lab.edu .b.d. /Internship/autum 2005.022175 pd.*

Nazari, A. Herremans. I.M. (2007). Extended VAIC Model measuring intellectual capital components. *Journal of intellectual Capital No. 84 PP 515-609.*

Negash, (2005). liberalization and the value relevance of accrued accounting information evidence from the Johannesburg security exchange. *Afro - Asian Journal of finance and accounting.*

Newbert, S.L. (2007). Empirical research on the Resources Based View of the firms. An assessment and suggestion for future research. *Strategic Management Journal vol.28 No 2 Pg 121-140*

NSE, (2001). *Nigerian stock exchange fact book*

Monaka, I. & Takeuchi, H. (1995). The knowledge creating company. *How Japanese companies create the dynasties of innovation.* New York, Oxford University Press.

Onafulajo, A.K., Eke, A.O. and Akinlabi, B.H. (2011). Impact of International Finance Reporting Standards on insurance management in Nigeria, *Euro- Journals Publishing No. 12, PP. 128-142.*

Ong, T.S. Yeoh, L.Y. and the B.H. (2011). Intellectual capital efficiency in Malaysian foods and beverage industry. *International Journal of Business and Behavioural Sciences vol 1 No1 PP. 16-31.*

Onwumare, J.U. (2005). *Business and Economic research methods,* Lagos Don-Vinton Limited.

Onyekwelu, U.L. & Ubesie. M.C. (2013). Effect of intellectual capital on corporative valuation of quote

 

pharmaceutical firms in Nigeria. *International Journal of Business and Management Review vol. 4 No.7 PP 30-39.*

Organization for Economic Co-Operation and Development (1998) Human capital investment:
An international comparison: *Paris, OECD, Centre for Educational Research and Innovation*

Osisioma B.C. (2002) restoring the Glory of the Ivory Tower, Covenant Rally, Ebony, State Abakaliki, June 12.

Osisioma B.C. (2004) Corporate strategic change in Nigeria. A search for an accounting perspective. An inaugural lecturer series No. 1 Nnamdi Azikwe University, Awaka.

Osisioma B.C. (2004) Re-engineering accouting profession the millennium challenges seminar paper.

Pulic, A. (2004). Intellectual capital- does it create or destroy value? *Measuring Business excellence, Vol. 8, No 12PP 62-68. Puntilo P (2009)* Intellectual capital and Business performance: Evidence from Italian Banking Industry. *Electronic Journal of Corporate Finance vol.4 No 12 PP97-115*