

VALUE-ADDED INTELLECTUAL COEFFICIENTS AND ECONOMIC VALUE ADDED OF QUOTED SERVICE FIRMS IN NIGERIA

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Abstract

The study examined the relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria. Ex Post Facto research design was adopted by the study. A sample size of Fifty-one (51) firms were selected from the population of the eighty two (82) service firms listed on the Nigeria stock exchange as at 31st December, 2019. Descriptive statistics and regression analysis was employed to test the hypotheses with the aid of E-view 10.0 statistical software. This study revealed that human capital efficiency, structural capital efficiency, capital employed efficiency and value-added intellectual coefficients have a significant positive relationship with economic value added of quoted service firms in Nigeria at 5% level of significance. On the premise of these study findings, the study recommended that strategic human resources policies must also be carefully formulated and properly implemented to x-ray the possibility of including human assets in the statement of financial position of corporate entities and to promote intellectual capital reporting.

Keywords: Value-Added Intellectual Coefficients, Economic Value Added and Nigerian service firms

INTRODUCTION

With the gradual movement of the global corporate world into the knowledge economy, it is becoming increasingly important and clear to business organizations that enough attention must be paid to the firm's intellectual capital base in order to thrive in this complex and dynamic world. Gone are the days when companies could focus solely on their physical capital while paying little or no attention to their intellectual capital and still make a lot of money. In today's business world, competition is so fierce that managers would use any resource at their disposal to oust competitors. Intellectual capital has also emerged as a valuable corporate resource that companies can use to acquire a competitive edge. Vidyarthi (2019) finds that businesses who have better managed their intellectual capital have a stronger competitive edge than their competitors. Human capital, which is an intrinsic aspect of intellectual capital, has been recognized as one of the primary factors of growth in every corporate firm today, (Tran and Vo 2018).

Firms have moved their attention from tangible assets to intangibles in order to achieve higher performance and competitive advantage. One of these intangibles is intellectual capital, which is made up of human capital, structural capital, and customer capital (Campanella, Derhy & Gangi, 2018). In a free market, tangible assets can be easily imitated or purchased, so they can't be a strategic asset or give the company a competitive advantage. Economic value added, like intellectual capital, is a metric that can aid investors in their decision-making. Economic value added (EVA) is the value created above and above the required remuneration.

The growing gap between market and book value in the knowledge-based economy is attributed to intangible assets that cannot be properly measured and reported within the traditional accounting framework, causing each company to use a different accounting method, posing a challenge to the measurement of IC in firms. However, because IC is intangible and non-physical in nature, measuring it is challenging. The standard accounting approach, which was designed for enterprises in an industrial economy, focuses on physical and financial assets while ignoring the majority of IC assets. Surprisingly, the International Accounting Standards/International Financial Reporting Standards did not contribute to redefining many of the concepts, principles and valuation methods of IC assets (Mohammed & Irbo, 2018; Adesina, 2019). The IASB's IAS 38 on Intangible Assets, as well as IFRS 3 on Business Combinations and IAS 36 on Asset Impairment, as well as the treatment of goodwill, research and development, and other identifiable intangible assets by IFRS adopting countries, all support the need to include Intellectual Capital in financial reporting. Financial statements have lost some of their usefulness for shareholders and many other users because to the relative lack of IC accounting recognition and its expanding significance in the value generation process. One of the key benefits of EVA, according to proponents, is that it corrects reported accounting results to minimize distortions found in measuring true economic performance. Conventional performance measures are criticized such as return on investment (ROI), return on assets (ROA), return on equity (ROE), return on sales (ROS), or earnings per share are deficient because they are uni-dimensional and thus unsuited to fully assessing firms' strategic accounting, firms' strategic outcomes and performance (Tiwari & Vidyarthi, 2018). Conventional accounting measures reflect only past performance and not future performance. Moreover, Nawaz (2017) argue that EVA is a better goal congruence than ROI. EVA helps overcome the goal incongruence that exists between the manager and the firm which cannot be resolved using ROI.

In recent years, the justification or otherwise for the role of knowledge, also known as intellectual capital, in driving company earnings and other corporate value indices has posed a difficult academic challenge. Intellectual capital has been described as a fundamental driver of business value enhancement by several academics (Rigdon, 2016; Pandey, Chandwani & Navare, 2018). Similarly, some academics believe that intellectual capital provides a platform for businesses to gain a competitive advantage over their competitors (Anwar, Abbas, Khan, & Razak, 2019; Juliansyah, Mellita-Sari, Andriyani & Sanusi, 2019). Xu and Wang (2019); Alea and Vasilije (2020); found out a statistically significant positive relationship between the components of intellectual capital and performance. In contrast to the above submissions, some other strand of empirical studies could not establish any statistical relationship between intellectual capital and firms' values. For example, Mačerinskienė and Simona (2019); Yao, Haris, Tariq, Javaid, and Khan (2019); William, Gaetano, and Giuseppe (2019) indicate an inverse relationship between intellectual capital and performance. Quite unlike prior studies that focused on one or two service firms, this present study exclusively considered the entire service sector, thus, resolving the sectorial gap. This study would be extended to 2019 as against prior studies which financial periods ended in 2018, thereby, filling the currency gap, hence the justification for this study. The study therefore, assesses the relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria.

REVIEW OF RELATED LITERATURE

Intellectual capital has become critical to sustaining competitive advantage, organizational success, innovation, superior organizational performance, core differentiator operator, improve new product development performance, enhance shareholder value, create a framework that allows for describing all resources at the firm's disposal and how they interact to create value, organizational performance (Nold, 2012; Andreeva & Garanina, 2016; Jordao, Vinicius & Novas, 2017). Edvinsson and Malone (1997) emphasize that intellectual capital includes all the processes and the assets which are not normally shown on the statement of financial position, including the intangible assets in modern accounting (mainly trademarks, patents and brands). Stewart (1998) considers intellectual capital to be intellectual material in terms of the knowledge, information, intellectual property and experience that can be put to use to create wealth. Stewart (1998) divides intellectual capital into three broad categories: human capital, structural capital and relational/customer capital.

Value Added Intellectual Coefficient (VAICTM)

This method was developed by Ante Pulić, an Austrian researcher in 1998 at the Austrian Research Center of Intellectual Capital (Pulić, 1998, 2000, 2002, 2004, 2006). The important element of the VAICTM method is the interpretation of income as the value added created by the company and as a result of its key resources. This value (including the efficiency of intellectual capital) is expressed in financial terms, which appear to be more objective due to their widespread use in traditional accounting systems (Dzenopoljac, Yaacoub, Elkanj & Bontis, 2017). The results should be seen in the context of a particular market or industry or the national economy, in which the firm operates. As a result, it is possible to determine whether the firm operates at a higher efficiency level or lower than the accepted average (Pal & Soriya, 2012). One of the criteria for the evaluation of activities of the company is the value added, for which intellectual capital is one of the factors determining its development.

The main assumption of the VAIC methodology is that it intends to calculate economic income, which Pulic (2000) labels as value-added, in a different way by treating labor expense as an asset, not as a cost. The details are as follows:

1. When calculating the value-added of a firm, Pulic (2000) deducts all labor expenses.
2. Labor expenses are treated as an asset that Pulic (2002) calls human capital.

3. The efficiency of this asset is calculated by counting how much value-added one unit spent on employees creates (Pulic, 2000).
4. Labor expenses no longer belong to the profit and loss account; they are placed as an asset on the statement of financial position (Pulic, 2002).

Pulic (2000) calculates value-added and the value of three types of intellectual capital: human capital, structural capital, and capital employed. Pulic (2000) noted that the value of human capital can be expressed by the labor expense. Structural capital equals the book value of the net assets of the firm (Firer & Williams, 2003). Pulic (2002) then calculated the ratio between each of the three forms of capital and value-added, resulting in capital employed efficiency (CEE), human capital efficiency (HCE), and structural capital efficiency (SCE). To conclude an overall measure of efficiency, Pulic (2002) adds the three efficiency measures:

$$VAIC = CEE + HCE + SCE$$

Thus, the $VAIC^{TM}$ coefficient is the sum of three parameters:

- 1) efficiency rate of capital employed - CEE (Capital Employed Efficiency),
- 2) the rate of the effectiveness of human capital - HCE (Human Capital Efficiency),
- 3) the rate of structural capital efficiency - SCE (Structural Capital Efficiency)

Value Added Intellectual Coefficient ($VAIC^{TM}$) developed by Ante Pulic is an analytical tool for measuring the efficiency of intellectual capital within a company. It was designed to enable management, shareholders and other relevant stakeholders to efficiently monitor and evaluate the efficiency of firm's total resources and each major resource component. The model gives a new insight into how value creation efficiency in the company is measured and monitored using accounting based figures.

Economic Value Added (EVA)

Economic value added (EVA) is a measure of a company's financial performance based on the residual wealth calculated by deducting its cost of capital from its operating profit, adjusted for taxes on a cash basis. EVA can also be referred to as economic profit, as it attempts to capture the true economic profit of a company (James, 2019). Economic Value Added (EVA) or Economic Profit is a measure based on the Residual Income technique that serves as an indicator of the profitability of projects undertaken. Its underlying premise consists of the idea that real profitability occurs when additional wealth is created for shareholders and that projects should create returns above their cost of capital (Stewart, 2013). EVA is the incremental difference in the rate of return over a company's cost of capital. Essentially, it is used to measure the value a company generates from funds invested into it. If a company's EVA is negative, it means the company is not generating value from the funds invested into the business. Conversely, a positive EVA shows a company is producing value from the funds invested in it (Mocciaro, Picone & Minà, 2012). The goal of EVA is to quantify the charge, or cost, of investing capital into a certain project or firm and to then assess whether it generates enough cash to be considered a good investment. The charge represents the minimum return that investors require to make their investment worthwhile. A positive EVA shows a project is generating returns in excess of the required minimum return. EVA as a performance indicator is very useful. The calculation shows how and where a company created wealth, through the inclusion of statement of financial position items. This forces managers to be aware of assets and expenses when making managerial decisions (Dheeraj, 2019).

$$EVA = \text{Net Operating Profit After Tax} - (\text{Capital Invested} \times WACC)$$

As shown in the formula, there are three components necessary to solve EVA: net operating profit after tax (NOPAT), invested capital, and the weighted average cost of capital (WACC)

$$WACC = R_D (1 - T_c) * (D / V) + R_E * (E / V)$$
$$\text{Weighted Average Cost of Capital} = (\text{Cost of Debt}) * (1 - \text{Tax Rate}) * (\text{Proportion of debt}) + (\text{Cost of Equity}) * (\text{Proportion of equity})$$

Now, understanding the notations of the formula:

- R_D = Cost of Debt
- T_c = Tax Rate
- D = Capital invested in the organization through Debt
- V = Total Value of the firm simply calculated as Debt + Equity
- R_E = Cost of Equity
- E = Capital invested in the organization through Equity

Cost of Debt is multiplied by $(1 - \text{Tax Rate})$ as there is tax saving on interest paid on debt. On the other hand, there is no tax saving on the cost of equity and hence the tax rate is not taken into account.

OR

$EVA = NOPAT - (WACC * \text{capital invested})$

Where NOPAT = Net Operating Profits After Tax

WACC = Weighted Average Cost of Capital

Capital invested = Equity + long-term debt at the beginning of the period and $(WACC * \text{capital invested})$ is also known as finance charge

Value Added Intellectual Coefficient and Economic Value Added

VAICTM indicator measures the efficiency with which a firm uses its physical, financial and intellectual capital to enhance stakeholder's value. The higher its value, the more favorable it is for the enterprise and the greater the ability to create value (Phusavat, Comepa, Sitko-Lutek & Ooi, 2011). Aggregated VAICTM helps to understand the total business efficiency and indicates its intellectual capacity. It measures how much of the new value has been created with the resources invested in monetary units. The high rate of VAIC is associated with a high level of value creation through the use of corporate assets, including intangible resources (Xu & Wang, 2018). Pulic (2000) assert that the traditional accounting is based on cost control, while today it is necessary to focus on value creation and value management. Business should concentrate on the long-term growth. In order to manage value, first it must be measured. Traditional indicators of business success, such as revenue growth, cash flow, profit, market share and market leadership, do not provide information about whether the company actually creates value for the shareholders / owners. The ability to create value for the company has become a new criteria of success. Moreover, the main field of investments for companies is usually intellectual resources. Tangible effects of value creation process (profit, higher price per share) are dependent on the intangible forms of value creation (increased speed and efficiency of communication, better relationships with customers, ability to create and maintain good reputation, investment in human resources). VAICTM indicator is a performance measurement that is assumed to be able to meet the requirements of modern economy, measuring the effectiveness of key resources in the enterprise. The VAICTM method relies on the concept of value added as the measure of performance, relative to intellectual capital (Bhasin, 2012; Forte, Tucker, Matonti & Nicolò, 2017; Vidyarthi, 2019). It consists of the sum of three component ratios, i.e. human capital efficiency (HCE), structural capital efficiency (SCE), which embraces both internal and relational capital

efficiency, and capital employed efficiency (CEE) which includes physical and financial capital efficiency (Rigdon, 2016; Pandey, Chandwani & Navare, 2018).

Many researchers have adopted the VAICTM model as a proxy of IC in analyzing relationship between performance of IC and company's performance. Most of the studies found positive relationship between IC or some of its components and company's performance (Matos, Vairinhos and Dameri (2017); Vidyarthi (2019); Anwar, Abbas, Khan and Razak (2019). However, not all studies support these results. Firer and Williams (2003); Kudlak, Szocs, Krumay and Martinuzzi (2018) found a significant negative association between human capital efficiency and company's performance. Additionally, Kao, Yeh, Wang and Fung (2018) reported non-significant association between human capital efficiency and capital gains made by investors. Further investigation on this relationship by Dabić, Lažnjak, Smallbone and Švarc (2018) also pointed out non-significant negative relationship between component of IC - structural capital efficiency and performance of companies based on return on assets (ROA).

Theoretical Framework

Knowledge-Based Theory

Knowledge is a strategic management resource that initiates competitive advantage in the firm through value addition to business data, information processes, and system operations. Knowledge is an important tool for change management that managers can use to respond to issues of staff retention (Ayuso & Navarrete-Báez, 2018). The knowledge-based view of the firm was propounded by Kogut and Zander (1993). Originating from the strategic management literature, this perspective builds upon and extends the resource-based view of the firm (RBV) initially promoted by Penrose (1959) and later expanded by others (Wernerfelt 1984, Barney 1991, Conner 1991). Knowledge-based view of the firm (KBV) is a management concept of organizational learning that provides firms with strategies for achieving competitive advantage. This is achieved through increased employee involvement in the formulation and administration of the operational goals and long-term transformational objectives of the firm. The continuous acquisition and transfer of knowledge within business organizations is necessitated by such factors as ever-changing competitive conditions in markets initiated by globalization, frequent deregulations, and technical advancements.

Knowledge-based view of the firm (KBV) is an important approach towards organizational learning that forms the basis for establishing human capital involvement in the structural and routine activities of the firm. KBV proposes the establishment of heterogeneous knowledge structures across the management hierarchies of a firm as a prerequisite condition for achieving sustainable knowledge-based competitive advantage. This is because knowledge-based resources are always characterized by difficulties of transmission, imitation, and social complexities (Khan, Yang & Waheed, 2019). As much as KBV is a relatively contemporary management concept, it draws much impetus and reference from classical theories of management such as the theory of the firm, the organizational theory, and the resource-based view of the firm. The fundamental assumptions of the knowledge-based theory of the firm are particularly believed to have stemmed from the resource-based view of the firm. However, the resource-based view of the firm does not give knowledge adequate recognition and, in fact, categorizes knowledge among the simple generic resources of the firm. Knowledge-based theory of the firm makes amends of these shortfalls by expounding on the strategic significance and distinctive characteristics of the different types of knowledge-based resources that portend competitive advantage for the firm, as demonstrated by the following assumptions:

- Knowledge-based resources hold the most strategic significance in firms.
- Production activities and processes in firms involve knowledge application.
- Individuals rather than organizations are responsible for creating, holding, and sharing knowledge.
- The incapability of markets to coordinate specialized knowledge necessitated the existence of firms, with management playing the coordination roles within the firms.
- Knowledge-based resources are characterized by difficulty of imitation and social complexities.
- Knowledge draws strategic significance from its appreciative value as opposed to other traditional factors of production, which depreciate.

This study is anchored on knowledge-based theory because the knowledge-based theory of the firm considers knowledge as the most strategically significant resource of a firm. Its proponents argue that because knowledge-based resources are usually difficult to imitate and socially complex, heterogeneous knowledge bases and capabilities among firms are the major determinants of sustained competitive advantage and superior corporate performance. Again, it is the theory of the firm that focuses attention on the resources and organizational capabilities as the principal sources of sustainable competitive advantage and the foundation for strategy formulation. Knowledge-based theory is relevant to this study since the theory suggests that people use their capacity-to-act in order to create value in mainly two directions; by transferring and converting knowledge externally and internally to the organization. The value grows each time a knowledge transfer or conversion takes place. The strategy formulation issues are concerned with how to utilize the leverage and how to avoid the blockages that prevent sharing and conversion. Activities that form the backbone of a knowledge-based strategy are to be aimed at improving the capacity-to-act both inside and outside the organization.

Empirical Review

Kehelwalatenna and Gunaratne (2010) investigated the relation between intellectual capital (IC) and firm performance. The study was conducted using data drawn for 2002 to 2006 from listed financial services and manufacturing sector firms in Sri Lanka. Results of the main analysis showed that IC was positively associated with firm performance (market-to-book value) and investor response. Sumedrea (2013) analyzed the structure of the intellectual capital and its influence on the economic performances based on the VAIC model. The study covered the period 2008-2011 in Brazil. The results were obtained by applying Panel least square regression models and suggest that, in crisis time, the development of companies is influenced by the human and the structural capital, while profitability (profit after tax) is additionally linked to the financial capital through the value added intellectual capital coefficient. Sujata, Vijay and Avinash (2013) focused on financial approach towards human capital management and has developed a conceptual managerial decision making model of Economic Value Added (EVA) in India with incorporation of human capital in the calculation of Weighted Average Cost of Capital (WACC) which will help the organizations in the long run to know the real value of EVA which has become the real indicator for the increase or decrease in shareholders fund. Deep and Narwal (2014) analyzed the relationship of intellectual capital with financial performance measures of Indian textile sector for a period of 10 years ranging from 2002 to 2012. Correlation and OLS regression were used in the study. It was observed that intellectual capital in textile sector has significant positive relationship only with profitability of the companies. The empirical analysis found that physical capital (VACA) was the one which was seen to have major impact on the profitability of the firms over the period of study Eddy and Joung (2015) determined the

influence of intellectual capital which was proxied with Human Capital, Structural Capital and Customer Capital on the company's financial performance measured by return on assets (ROA). Sample was the banking industry, which was listed on the Indonesian Stock Exchange (IDX) period 2008-2012. Using multiple regression analysis, intellectual Capital measurement model was that of Pulic (1998). The results showed that (1) Human Capital (HC) effect on the financial performance of +2.085 regression coefficient, that means the higher Human Capital (HC), the better the financial performance. (2) Customer Capital (CC) effect on financial performance of + 3.568 regression coefficient. Ezejirofor, Nwakoby, and Okoye (2015) investigated the impact of human resource management on business performance. The data was collected and evaluated using a five-point Likert's scale in a survey study design. The idea was tested using simple regression analysis. Human Resource Management has an effect on the functioning of a company organization, according to the study. This has to do with competent management as a motivator, as well as training and growth. Kamini, Harsh and Deepak (2016) measured the intellectual capital (IC) of publicly listed firms in India and empirically examined the relationship among IC, financial performance and market valuation of these firms. Value creation efficiency of the firms listed on CNX Nifty over the period ranging from 2004–2005 to 2013–2014 has been estimated using Pulic's Value Added Intellectual Coefficient (VAIC). Human capital efficiency was found to have a strong positive association with profitability, while structural capital efficiency did not have any significant impact on any of the measures of financial performance. For a period of ten years, Onyekwelu, Okoh, and Iyidiobi (2017) evaluated the impact of intellectual capital on financial performance of Nigerian enterprises in the banking industry (2004-2013). The ex post facto research design was used in this study. Data was gathered from these banks' annual reports and accounts, as well as data from the Nigerian Stock Exchange's (NSE) publications, and evaluated using a regression technique. The study found that IC has a positive and significant impact on bank financial performance, with some exceptions. The findings also revealed that the banks differed statistically in terms of intellectual capital and financial performance indicators. The adoption of Human Resource Accounting on the Profitability of Corporate Organizations was studied by Ezejirofor, John-Akamelu, and Iyidiobi (2017). This study used an exploratory research design and time series data. The study's data came from a group of ten (10) Nigerian commercial banks. With the help of SPSS version 20.0, the data was analyzed and assessed using the t-test statistical tool. The study discovered that a raise in staff compensation has a beneficial impact on organizational profitability, as well as that the amount of staff increment has an impact on organizational profitability. From 2010 to 2016, Nwaiwu and Aliyu (2018) investigated the association between intellectual capital reporting and financial performance measures of listed banks in Nigeria. Ex-post facto research was used in this study. The study's data came from the websites of fifteen (15) commercial banks' published annual financial statements as of December 31, 2016, as well as the Nigeria Stock Exchange. The data was analyzed using the OLS regression method with the help of SPSS version 23 and Eview version 9. The findings of the study revealed mixed results as some elements of intellectual capital reporting were not significantly related to revenue growth and return on investment. The study concluded that intellectual capital has not fully related to the financial performance of quoted commercial banks in Nigeria. Sharma (2018) estimated the intellectual capital coefficient of the firms under study and to study the relationship, if any between intellectual capital and its constituents in United States. Pulic's VAIC (modified) were used to estimate the intellectual capital of BSE S&P 500 listed analyzed using Pearson correlation and linear multiple regression analysis using CMIE PROWESS. Findings showed that almost all firms under study have a good VAIC score means above 4 and the top VAIC scorer firms were mainly from refinery, metal, cement, steel, tobacco. Sedeaq (2018) examined the impact of

intellectual capital on firm performance of real estate companies listed in Borsa Istanbul, using data of 27 listed companies over the period 2004-2015. OLS regression was used to examine the impact of intellectual capital (VAIC); Human capital efficiency (HCE), Structural capital efficiency (SCE), and Capital employed efficiency (CEE) on market, productivity, and financial performance. The findings showed that SCE consider as a key role of value creation in real estate companies which has a positive significant relation with MB, ROE, and EPS before the crisis and with ROA and ROE after the crisis.

Saudah, Mike and Richard (2019) examined the impact of IC on management accounting practices, specifically, performance measurement and corporate performance in Nigeria. The study was both exploratory and descriptive in nature which was conducted through a survey in over 100 large companies covering both high and low levels of IC. Results suggested some evolution in performance measurement approaches due to the impact of IC and they also indicated that IC does influence corporate performance. William, Gaetano, and Giuseppe (2019) examined the effect of Intellectual Capital (IC) on financial performance of Italian listed firms for the period from 2008 to 2017 and performing Ordinary Least Squares (OLS) regression models. The findings suggested that, when taken in its aggregated form, IC exerted a positive impact on firms' financial performance measured as firms' profitability and growth in revenues as well as on market value. Xu and Liu (2019) explored the value creation effect of intellectual capital on corporate performance of energy companies from 2010 to 2016. The study conducted an empirical research based on the Ohlson model and used quantile regression to analyze the impact of value-added intellectual coefficient (VAIC) on sustainable performance at different life cycle stages. The study also concluded that value-added human capital coefficient (VAHU) and value-added capital assets coefficient (VACA) were the most important component of intellectual capitals to economic sustainable performance at the growth stage, maturation stage, and decline stage. Gupta, Goel and Bhatia (2019) explored the effect of Value Added Intellectual Coefficient (VAIC) on IT firms' profitability for the time period of 2011 to 2018. The data used in the study was collected from Capital IQ database and annual reports of companies. Correlation and multiple regression were applied to investigate the relationship between IC and firms' profitability. The results obtained showed that Indian IT companies' intellectual capital has a positive effect on firms' profitability. Further, human capital and structural capital have a significant and positive relationship with firms' financial performance whereas capital employed was found to be insignificant. Aleša and Vasilije (2020) examined the relationship between intellectual capital and financial performance of listed Slovene companies from 2014-2018. Multiple regression technique was adopted. The dependent variable was measured with Market-to-Book Value and Tobin's q, while intellectual capital was proxied with Human Capital Efficiency Structural capital efficiency, Capital Employed Efficiency. The regression result revealed the existence of a positive relationship between the components of intellectual capital and Tobin's Q.

Some scholars have described intellectual capital as being a key driver of corporate value enhancement (Rigdon, 2016; Pandey, Chandwani & Navare, 2018). Similarly, other strand of researchers submit that intellectual capital provides a platform through which firms enjoy competitive advantage, well and above their contemporaries (Meles, Porzio, Sampagnaro & Verdoliva, 2016; Anwar, Abbas, Khan, & Razak, 2019); Aleša and Vasilije (2020); found out a statistically significant positive relationship between the components of intellectual capital and performance. Quite unlike prior studies that focused on one or two service firms, this present study exclusively considered the entire service sector, thus, resolving the sectorial

gap. This study was extended to 2019 as against prior studies which financial periods ended in 2018, thereby, filling the currency gap, hence the justification for this study.

Methodology

Research Design

The research design that was employed in this study is the *ex-post facto* research design. An *Ex-post Facto* research determines the cause-effect relationship among variables. *Ex-post Facto* seeks to find out the factors that are associated with certain occurrence, conditions, events or behaviours by analyzing past events or already existing data for possible causal factors (Kothari & Garg 2014).

Population and Sample Size

The population of this study consists of the eighty two (82) service firms listed on the Nigeria stock exchange as at 31st December, 2019.

This study adopted purposive sampling technique. The sample comprised firms that meet the following conditions: firms that have been listed on the Nigerian Stock Exchange (NSE) as at 2009; firms whose stocks have been trading actively on the floor of NSE during the period of interest (2010-2019); firms that have data available for the period of interest; firms that consistently filed their annual reports and accounts with the Nigeria Stock Exchange without missing any year during the study period. Given these conditions, fifty-one (51) firms were selected as the sample size. The reason for the choice of this time frame is the availability of published annual report and accounts of the sample organizations and to have a fairly, reasonably, reliably and up-to-date available financial panel data.

Method of Data Analysis

This study made use of secondary data precisely. The data were sourced from publications of the Nigerian stock exchange (NSE), fact books and the annual report and accounts of the sampled quoted service firms, particularly the comprehensive income statement and statement of financial positions of these companies as well as their respective notes to the accounts for the period 2010-2019. Both the dependent and independent variables would be computed from the data extracted from publications of the Nigerian stock exchange (NSE), the annual report and accounts of the selected quoted companies and ratios were computed from the figures as reported in the annual reports.

Model Specification

The model for this study was adapted from Pulic (2000):

$$ROA = \beta_0 + \beta_1 CEE + \beta_2 SCE + \beta_3 HCE + \varepsilon$$

Where:

ROA = Return on Assets

CEE = Capital Employed Efficiency

SCE = Structural Capital Efficiency

HCE = Human Capital Efficiency

To test the hypotheses, this study would estimate the following regression equations:

$$EVA_{it} = \beta_0 + \beta_1 VAIC_{it} + \beta_2 LEV_{it} + \beta_3 FSZ_{it} + \varepsilon_{it} \quad - \quad - \quad - \quad - \quad i$$

Thus:

Where:

ε_{it} is the error term capturing other explanatory variables of the firm not explicitly included in the model.

β_0 is the intercept of the regression.

$\beta_1, \beta_2,$ and β_3 are the coefficients of the regression (Intellectual Capital)
 EVA_{it} = Economic Value Added of firm i in period t
 $VAIC_{it}$ = Value Added Intellectual Coefficient of firm i in period t
 LEV_{it} = Leverage of firm i in period t
 FSZ_{it} = Firm Size of firm i in period t
 i = individual firms
 t = time periods

Operationalization of Variables

Independent Variables

Intellectual capital which is the independent variable would be proxied into Capital Employed Efficiency (CEE); Human Capital Efficiency (HCE); and Structural Capital Efficiency (SCE):

- Capital Employed Efficiency (CEE) measure the efficiency of Capital Employed (CE), where (CE) = book value of firm net assets.
 $CE = \text{physical capital} + \text{financial assets}$
 $CE = \text{Total assets} - \text{intangible assets}$
 $CEE = VA/CE$
 CE represents tangible resources while HC represents intangible resource (Pulic, 2000).

$$VA_{it} = OUTPUT_{it} - INPUT_{it}$$

Output_{it} is the total income generated by the firm from all products and services sold during the period t , and input_{it} represents all the expenses incurred by the firm during the period t except cost of labour, tax, interest, dividends and depreciation.

- Human Capital Efficiency (HCE). In VAIC model, HC is defined as salary and wages in a period (Pulic, 1998). Besides showing the firm size, high HC reflects higher employee skills that would add more value compared to employees with lower salary and wages. HCE shows the efficiency of HC usage in creating VA. If the human capital cost is low while VA is high then the firm uses its HC efficiently.

$$HCE = VA/HC$$

- Structural Capital Efficiency (SCE). Structural capital (SC) includes strategy, organization network, patent, brand name. Internal structural capital is developed internally, consists of policy and process, work environment, innovation created by research and development. SC is measured using Pulic (1998)

$$SC = VA - HC$$

HC and SC are in reverse proportion, increasing HC will decrease SC. SCE is measured (Pulic, 1998):

$$SCE = SC/VA$$

- Intellectual Capital Efficiency (ICE) is calculated:
 $ICE = HCE + SCE$
- VAIC - value added efficiency of tangible and intangible assets:
 $VAIC = CEE + HCE + SCE$

Dependent Variable

Economic Value Added (EVA) served as the dependent variable of this study.

$$EVA = \text{Net Operating Profit After Tax} - (\text{Capital Invested} \times \text{WACC})$$

As shown in the formula, there are three components necessary to solve EVA: net operating profit after tax (NOPAT), invested capital, and the weighted average cost of capital (WACC)

$$WACC = R_D (1 - T_c) * (D / V) + R_E * (E / V)$$

Weighted Average Cost of Capital = (Cost of Debt) * (1 – Tax Rate) * (Proportion of debt) + (Cost of Equity) * (Proportion of equity)

Now, understanding the notations of the formula:

- R_D = Cost of Debt
- T_c = Tax Rate
- D = Capital invested in the organization through Debt
- V = Total Value of the firm simply calculated as Debt + Equity
- R_E = Cost of Equity
- E = Capital invested in the organization through Equity

Cost of Debt is multiplied by (1 – Tax Rate) as there is tax saving on interest paid on debt. On the other hand, there is no tax saving on the cost of equity and hence the tax rate is not taken into account.

OR

$EVA = NOPAT - (WACC \times \text{capital invested})$

Where NOPAT = Net Operating Profits After Tax

WACC = Weighted Average Cost of Capital

Capital invested = Equity + long-term debt at the beginning of the period
and (WACC* capital invested) is also known as finance charge

3.5.3 Control Variables

- i. Leverage: $\frac{\text{Total Debt}}{\text{Total Assets}}$
- ii. Firm Size: Natural logarithm of Total Assets

Method of Data Analysis

The analyses applied the data collected from publications of the Nigerian stock exchange (NSE) and the annual report and accounts of the sample quoted companies. Both the dependent and independent variables were computed from the data extracted from publication of the Nigeria stock exchange (NSE), the annual report and accounts of the selected quoted companies and ratios were computed from the figures as reported in the annual reports.

Descriptive statistics was used to summarize the mean, median, standard deviation, skewness, kurtosis, maximum and minimum of the study variables.

Inferential statistics of the stated hypotheses was carried out with the aid of E-view 10.0 statistical software, using:

- i. **Pearson Coefficient of Correlation:** is a good measure of relationship between two variables, tells us about the strength of relationship and the direction of relationship as well.
- ii. **Multicollinearity Test:** was used to determine if one or more pairs of the explanatory (independent) variables are highly or perfectly correlated..
- iii. **Heteroskedasticity Test:** was used to describe the case where the variance of errors or the model is not the same for all observations, while often one of the basic assumptions in modelling is that the variances are homogeneous and that the errors of the model are identically distributed.
- iv. **Regression Analysis:** predicts the value of a variable based on the value of the other variable and explains the impact or effect of changes in the values of

variable on the values of the other variables. Panel Least Square (PLS) Regression Analysis would be used for the study.

- v. **Hausman Specification Test:** was conducted to ascertain whether fixed effect model (FEM) or random effect model (REM) is most appropriate for the data (Rutherford, 2016).

Decision Rule

Accept the alternative (H_1) hypothesis, if the P-value of the test is less than 0.05. Otherwise reject.

DATA PRESENTATION AND ANALYSIS

Table 1: Descriptive Statistics of Study Variables

	EVA	VAIC	LEV	FSZ
Mean	0.1150	4.4640	4.9330	10.8610
Median	0.1100	3.0450	4.7000	10.8000
Maximum	0.1300	10.5400	10.5800	12.0200
Minimum	0.1000	1.4200	1.4600	9.9300
Std. Dev.	0.0097	3.3677	2.8716	0.7689
Skewness	0.3828	0.8392	0.8672	0.1953
Kurtosis	2.1626	2.0434	2.7516	1.6403
Jarque-Bera	15.9500	31.4025	7.5457	14.2339
Probability	0.0003	0.0000	0.0229	0.0005
Sum	1.1500	44.6400	49.3300	58.6100
Sum Sq. Dev.	0.0009	102.0732	74.2168	5.3215
Observations	510	510	510	510

Source: E-Views 10.0 Descriptive Output, 2020

Interpretation

This study considered descriptive statistics (mean, standard deviation, minimum and maximum) for the panels for 150 observations (that is, 51 firms x 10 years). Table 1 depicts EVA of an average of 0.1150 with a minimum of 0.1000 and a maximum of 0.1300 and at a standard deviation of 0.0097. HCE was on the average of 3.8500 with a standard deviation of 3.1273, a minimum of 1.2200 and a maximum of 9.6000. On the average, SCE stood at 57%, the minimum SCE stood at 18% while the maximum SCE stood at 90% of the firms under study. Similarly, on CEE, the results showed that on the average the mean value is approximately 4%, with a standard deviation of 0.0189. The maximum value of CEE for the sample firms is approximately 7% while the minimum is 1%. On the average, VAIC stood at 4.4640 with a standard deviation of 3.3677, a maximum of 10.5400 and a minimum of 1.4200.

Correlation Matrix

The correlation matrix explains the nature of relationship between the dependent and independent variables of the study as well as the independent variables among themselves. The summary of the associations among the variables of the study is presented in table.2.

Table 2: Pearson Correlation Matrix

	EVA	VAIC	LEV	FSZ
EVA	1.0000	0.4559	0.0938	0.3472
VAIC	0.4559	1.0000	0.2622	0.6269
LEV	0.0938	0.2622	1.0000	0.0044
FSZ	0.3472	0.6269	0.0044	1.0000

Source: E-Views Correlation Output, 2020

Table 2, shows no indication of multicollinearity as the highest correlation is 0.6993 (between intellectual capital components and EVA). Multicollinearity is considered to exist if the correlation coefficient is above 0.8 as it may lead to spurious regression. As indicated in table 2, the study found that all pairs had a correlation of less than 0.80 which is the threshold to permit retaining of all the variables under study (Bartels, 2016). The table shows that VAIC, LEV and FSZ are positively correlated with EVA, with respective correlation coefficients of 0.4559, 0.0938 and 0.3472.

Test of Hypotheses

H₀₁: There is no significant relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria

H₁: There is significant relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria

Table 3: Heteroscedasticity Test between HCE, SCE, CEE and EVA

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.320188	Prob. F(5,4)	0.8783
Obs*R-squared	2.858343	Prob. Chi-Square(5)	0.7218
Scaled explained SS	0.343294	Prob. Chi-Square(5)	0.9967

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/29/20 Time: 10:53

Sample: 2010 2019

Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000227	0.001418	0.160245	0.8805
HCE	-5.66E-06	3.86E-05	-0.146510	0.8906
SCE	0.000129	0.000237	0.543138	0.6159
CEE	0.001199	0.002717	0.441108	0.6819
LEV	-1.49E-06	1.52E-05	-0.098202	0.9265
FSZ	-2.48E-05	0.000127	-0.195291	0.8547

R-squared	0.285834	Mean dependent var	5.34E-05
Adjusted R-squared	-0.606873	S.D. dependent var	6.89E-05
S.E. of regression	8.74E-05	Akaike info criterion	-15.56883
Sum squared resid	3.05E-08	Schwarz criterion	-15.38728
Log likelihood	83.84415	Hannan-Quinn criter.	-15.76799
F-statistic	0.320188	Durbin-Watson stat	2.315610
Prob(F-statistic)	0.878332		

Source: E-Views 10.0 Regression Output, 2020

Interpretation of Diagnostic Test

Homoscedasticity rule states that:

- H_0 : The residuals are homoscedastic
- H_a : The residuals are heteroscedastic

Heteroscedasticity is present if the test statistic has a p-value below an appropriate threshold of 5% ($p < 0.05$) then the null hypothesis of homoskedasticity is rejected and heteroskedasticity assumed. With a p-value of 0.878332 in table 3, we fail to reject the null hypothesis (that variance of residuals is constant) and therefore infer that their residuals are homoscedastic, thus, the problem of heteroscedsticity is solved.

Table 4: Panel Least Square (PLS) Regression Analysis testing the relationship between HCE, SCE, CEE and EVA

Dependent Variable: EVA

Method: Panel Least Squares

Date: 11/26/20 Time: 15:14

Sample: 2010 2019

Periods included: 10

Cross-sections included: 51

Total panel (balanced) observations: 510

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.333707	0.102170	4.598309	0.0000
HCE	0.333466	0.003148	8.101090	0.0000
SCE	0.143565	0.009195	3.266181	0.0012
CEE	0.249430	0.028266	3.701458	0.0002
LEV	-0.000450	0.003347	-0.134401	0.8931
FSZ	-0.015116	0.010049	-2.210504	0.0275
R-squared	0.722006	Mean dependent var		0.206362
Adjusted R-squared	0.712304	S.D. dependent var		0.228340
S.E. of regression	0.226931	Akaike info criterion		-0.116650
Sum squared resid	25.95473	Schwarz criterion		-0.066834
Log likelihood	35.74580	Hannan-Quinn criter.		-0.097119
F-statistic	32.68108	Durbin-Watson stat		1.976300
Prob(F-statistic)	0.000000			

Source: E-Views 10.0 Regression Output, 2020

Interpretation of Regression Result

The panel least square regression model in table 4 indicates that:

$$EVA = 0.333707 + 0.333466HCE + 0.143565SCE + 0.249430CEE$$

The regression model shows that there is a significant positive relationship between HCE, SCE, CEE and EVA. The value of β_1 (SHCE) is 0.333466 which shows that 1% change in HCE will cause a positive change in EVA by 33.35%; 1% change in SCE (β_2) will positively cause 14.36% change in EVA. Similarly, 1% change in CEE (β_3) will positively exert 24.94% change in EVA. The value of the t-statistics are = 8.101090; 3.266181 and 3.701458 for β_1 , β_2 , and β_3 respectively. The adjusted R^2 is 0.712304 which shows that 71.23 % variation in EVA is explained by the explanatory variables (HSC, SCE, CEE) and the control variables (LEV and FSZ), while the remaining 28.77% variation in EVA is responsible by other factors outside the scope of this study model. Since, the value of Durbin Watson = 1.976300 is less than 2, this shows that the problem of auto-correlation does not exist in this model. Value of

F-statistic equals 32.68108 with an associated P-value = 0.000000 shows that overall model is a good fit.

Decision

As the Probability F-value of the model = 0.000000 is significant at 5% level of significance. Thus, H_0 is rejected and H_1 is accepted, which upholds that there is a significant positive relationship between Intellectual Capital Coefficients and Economic Value Added of quoted service firms in Nigeria at 5% level of significance.

Table 5: Fixed Effect Model (FEM) testing the effect of HCE, SCE, CEE on EVA

Dependent Variable: EVA
Method: Panel Least Squares
Date: 11/26/20 Time: 15:15
Sample: 2010 2019
Periods included: 10
Cross-sections included: 51
Total panel (balanced) observations: 510

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.347971	0.134132	-5.800271	0.0000
HCE	0.000575	0.002638	7.217799	0.0000
SCE	0.003261	0.007296	2.594244	0.0098
CEE	0.020631	0.027962	6.737822	0.0000
LEV	0.003623	0.004281	0.846462	0.3977
FSZ	0.055439	0.013191	4.202661	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.697175	Mean dependent var	0.206362	
Adjusted R-squared	0.636260	S.D. dependent var	0.228340	
S.E. of regression	0.171443	Akaike info criterion	-0.585833	
Sum squared resid	13.34435	Schwarz criterion	-0.120878	
Log likelihood	205.3873	Hannan-Quinn criter.	-0.403540	
F-statistic	18.11783	Durbin-Watson stat	1.963786	
Prob(F-statistic)	0.000000			

Source: E-Views 10.0 Regression Output, 2020

Table 6: Hausman Test Comparing FEM and REM Regression Result on HCE, SCE, CEE and EVA

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	22.361942	5	0.0004

Source: E-Views 10.0 Hausman Output, 2020

Interpretation:

The Fixed Effect Model (FEM) is preferred over the Random Effect Model (REM) since the P-value of the test = 0.0004 is less than the conventional 5% level of significance, hence H_1 is accepted and H_0 rejected, thereby, submitting to the empirical evidence that there is a

significant positive relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria at 5% level of significance.

Discussion of Findings

This study ascertained the nexus between intellectual capital and economic value added of quoted service firms in Nigeria for a ten year period covering from 2010-2019. The independent variable (intellectual capital) was proxied by human capital efficiency, structural capital efficiency, capital employed efficiency and value-added intellectual coefficients while economic value added served as the dependent variable of the study.

The regression model for the Hypothesis showed that there is a significant positive relationship between HCE, SCE, CEE and EVA. The value of β_1 (SHCE) is 0.333466 which shows that 1% change in HCE will cause a positive change in EVA by 33.35%; 1% change in SCE (β_2) will positively cause 14.36% change in EVA. Similarly, 1% change in CEE (β_3) will positively exert 24.94% change in EVA. The value of the t-statistics are = 8.101090; 3.266181 and 3.701458 for β_1 , β_2 , and β_3 respectively. The adjusted R^2 is 0.712304 which shows that 71.23 % variation in EVA is explained by the explanatory variables (HSC, SCE, CEE) and the control variables (LEV and FSZ), while the remaining 28.77% variation in EVA is responsible by other factors outside the scope of this study model. Since, the value of Durbin Watson = 1.976300 is less than 2, this shows that the problem of auto-correlation does not exist in this model. Value of F-statistic equals 32.68108 with an associated P-value = 0.000000 shows that overall model is a good fit.

The findings of this study corroborate the study of Aleša and Vasilije (2020); Bayraktaroglu, Calisir and Baskak (2019); Yao, Haris, Tariq, Javaid, and Khan (2019); Sedeaq (2018); Purwaningsih (2018); Nwaiwu and Nwaekpe (2018).

CONCLUSION AND RECOMMENDATION

This study assessed the nexus between intellectual capital and economic value added of quoted service firms in Nigeria for a ten year period covering from 2010-2019. The independent variable (intellectual capital) was proxied by human capital efficiency, structural capital efficiency, capital employed efficiency and value-added intellectual coefficients while economic value added served as the dependent variable of the study. The study obtained data from annual reports and account and publications of the service firms that operated during 2010-2019. With the aid of E-Views 10.0, Descriptive Statistics of this study was applied, while Inferential Statistics using Pearson correlation coefficient, Multicollinearity test, Heteroskedasticity test, Panel Least Square regression analysis and Hausman test were employed. This study concluded that human capital efficiency, structural capital efficiency, capital employed efficiency and value-added intellectual coefficients have a significant positive relationship with economic value added of quoted service firms in Nigeria at 5% level of significance.

Recommendations

On the basis of these findings, the study recommended that strategic human resources policies be carefully formulated and implemented in order to investigate the possibility of including human assets in corporate entities' statements of financial position and to promote intellectual capital reporting.

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