

Intellectual Capital and Economic Value Added of Quoted Service Firms in Nigeria

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ABSTRACT

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. Human Capital Efficiency, Structural Capital Efficiency and Capital Employed Efficiency were used to proxy Intellectual Capital, while Economic Value Added served as the dependent variable. Ex-Post facto research design was employed. Fifty one (51) quoted service firms constituted the sample size of this study. Secondary data were extracted from the annual reports and accounts of the sampled firms and were analysed using E-Views 10.0 statistical software. The study employed inferential statistics using Pearson correlation, Heteroskedasticity test and Panel Least Square (PLS) regression analysis. Findings from the empirical analysis showed that there is a significant positive relationship between Human Capital Efficiency, Structural Capital Efficiency Capital Employed Efficiency and Economic Value Added at 5% level of significance. It was recommended inter alia that firms should invest more in Human Capital Efficiency to improve performance.

KEYWORDS: Intellectual Capital, Economic Value Added, Human Capital Efficiency, Value Added intellectual Coefficient

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Background to the Study

Intellectual capital (IC) is a group of knowledge assets that are attributed to an organization and most significantly contribute to an improved competitive position of the organization by adding value to the defined key stakeholders (Ozkan, Cakan & Kayacan, 2017). Intellectual capital (IC) can be defined as the intangible assets that comprise of knowledge, experience, customer rapport and infrastructure that elevate the performance of organisation due to its ability to create value creation and competitive advantage (Si, 2019). IC is Value-Added Intellectual Coefficients (VAIC) that has been developed by Pulic (2000a). With the gradual shift of global business world into the knowledge economy, it is becoming increasingly important and obvious to business organisations that to survive in business in this complex and dynamic world, adequate attention must be paid to the intellectual capital base of the firm. The rise of the knowledge society can, however, be considered a quantum jump in a long history of development of human skills and know-how. Adam Smith, in *The Wealth of Nations*, underlined that improvement of workers' skills was a fundamental source of economic progress. He also stressed that investment in human capital and skills affects personal incomes and the structure of wages. The current generation of digital information and communications technology allows the mobilisation of complex information structures in a way not hitherto possible, enabling the coding, stocking, transmission, processing, buying and selling of digital

artefacts independent of distance. Furthermore, the scope for innovation, operations and market supply is global. As a result, entrepreneurial skills in all sectors of the economy are actively engaged in harnessing tools that will induce a cultural and social revolution with far-reaching consequences for societal cohesion, economic relations and individual identity well into the 21st century. Accordingly, intellectual capital has also become a prominent subject to delve into with respect to the service sector as one of the knowledge intensive sectors because it relies upon a massive amount of human capital and customer relations for its survival. Hence the service sector has to stay innovative and aggressive in developing new products and services especially in the current rapidly changing global environment. Incessant innovation and knowledge creation have become the key sources for sustainable competitive advantage since at its heart, the whole operations of service sector build upon ingenuity, accommodating unique services and offering great products.

Firms' earnings must exceed the cost of debt and equity, in order to create wealth. Economic value added (EVA) measures the difference between the return on company's capital and the cost of that capital. EVA is a measurement of the true economic profit generated by a firm (Amahalu, Okoye & Obi, 2018) and is calculated by comparing a firm's net operating profit after tax (NOPAT) to the total cost all its

forms of capital which includes debt as well. If NOPAT exceeds the cost of capital, it gives a positive EVA and on the other hand, if the NOPAT is less than the cost of capital, it gives a negative EVA. Stewart (2013) asserts that EVA stands well out from the crowd as the single best measure of value creation on continuous basis and EVA is almost 50% better than traditional accounting based measures in explaining changes in the shareholders wealth.

Statement of the Problem

In knowledge-based economy, the growing distance between the market and book value is attributed to intangible assets that cannot be properly measured and reported within the traditional accounting framework, thereby, causing each company to use a different accounting method, therefore, posing a challenge towards the measurement of IC in firms. However, the measurement of IC is difficult since it is intangible and non-physical in nature. The relative lack of IC accounting recognition and its growing role in the value creation process, imply that financial statements have lost some of their value for shareholders and many other users. EVA proponents assert that an important benefit of EVA is that, it adjusts reported accounting results to eliminate distortions encountered in measuring true economic performance. Conventional performance measures are criticised 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). Bayraktaroglu, Calisir and Baskak (2019); Chukwu, Ugo, and Osisioma (2019); Aleša 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); Tarigan, Listijabudhi, Hatane and Widjaja (2019); William, Gaetano, and Giuseppe (2019) indicate an inverse relationship between intellectual capital and performance. The divergent views from the reviewed strands of literatures which ranged from positive to negative and to non-significant relationship between intellectual capital and performance led to a gap in literature which this study tends to fill. Hence, the need for this study.

Objectives of the study

The broad objective of this study is to evaluate the nexus between intellectual capital and economic value added of quoted service firms in Nigeria. The specific objectives of this study are to:

1. Assess the relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria

Research Hypothesis

The following null research hypotheses were formulated to guide this study:

Ho₁: There is no significant relationship between Value-Added Intellectual Coefficients and Economic Value Added of quoted service firms in Nigeria

Conceptual Review

Intellectual Capital (IC)

Intellectual capital is the intangible value of a business, covering its people (human capital), the value relating to its relationships (relational capital), and everything that is left when the employees go home (structural capital), of which intellectual property (IP) is but one component (Goergen, Chahine, Wood & Brewster, 2016). Intellectual capital is the sum of everything everybody in a company knows that gives it a competitive edge (Matos, Vairinhos & Dameri, 2017). Intellectual capital is considered an asset, and can broadly be defined as the collection of all informational resources a company has at its disposal that can be used to drive profits, gain new customers, create new products or otherwise improve the business. It is the sum of employee expertise, organizational processes, and other intangibles that contribute to a company's bottom line (Chen, 2019). Intellectual capital is a business asset, although measuring it is a very subjective task. This asset to a firm is not booked on the statement of financial position as intellectual capital, instead, to the extent possible, it is integrated into intellectual property (as part of intangibles and goodwill on the balance sheet), which in itself is difficult to measure (Martín de Castro, Delgado-Verde, López-Sáez, Navas-López, 2011).

Human Capital Efficiency

Human capital is the most important asset that exists within a firm. It represents the human factor in an organisation where by combination of intelligence, skills, knowledge, aptitudes and expertise that gives the organisation its distinctive character which those traits contributing to production and profitability, thus improve organizational performance (Lee, Tang, Yip & Sharma, 2018). Additionally, Li and Lin (2017) argue that the ability of a corporate organization to successfully implement business strategies solely depends on efficient use of intangibles asset, particularly human capital. Efficiency in using resources plays an important role in determining the strength of the organization. Measuring human capital performance has become an essential issue for companies in today's business world since it may help them to get the right perspective on human capital (Intarakumnerd, 2017). A proper performance measurement tool could provide the firms with the necessary information for creating an action plan in order to improve human capital contribution to the organizational success. Human Capital Efficiency measures the value added by the Human Resources of an organization. Value Added Intellectual Coefficient (VAIC) is a method used to measure the value creation Efficiency of a company by using its accounting based figures (Pulic, 2000).

Structural Capital Efficiency

Structural capital is a strategic asset which is comprised of non human assets such as systems and programs, research and development and intellectual property rights these sub variables helps the organization to achieve its goals and objectives hence improved business performance (Sardo, Serrasqueiro & Alves, 2018). The structural capital is the structure that supports the human capital and includes organizational processes, procedures, technologies, information resources and intellectual property rights (Xu & Wang, 2019). Janošević, Dženopoljac and Bontis (2013) emphasize that the structural capital is what remains when the employees go home and include database structures, manuals and training materials. Structural capital stems

from human capital and is a combination of knowledge and intangible assets derived from the processes within the organization and encompasses elements of efficiency, procedural innovativeness and access to information for codification into knowledge. These processes and structures are needed by the employee in order to be productive (Ogbodo, Amahalu & Abiahu, 2017; Jordão & De-Almeida, 2017). Thus, organizations that have a strong structural capital will have a supportive culture that permits their employees to try new things, to learn and to practice them. The structural capital includes management relationship, organization structure, development, and the relationship capital refers to the marketing relationship and it is very important for any organization. This capital may enhance organizational effectiveness by transferring knowledge (Smriti & Das, 2018).

Capital Employed Efficiency

Capital employed is the total amount of capital used for the acquisition of profits by a firm or project. Capital employed can also refer to as the value of all the assets used by a company to generate earnings (Sherry, 2016). Capital efficiency is the ratio between dollar expenses incurred by a company and dollars that are spent to make a product or service (Hayes, 2020). This is the metric to look at because the more efficiently capital is used to produce a product or service, the better chance a company has for approaching profitability (Adam, 2020). If the amount of capital employed is high and is not sourced from Equity shareholders, then it shows a higher level of risk. It shows an aggressive business expansion and growth plans. If the plan goes successfully then it may provide a higher return to the investors on their investment (Adam, 2020). By employing capital, companies invest in the long-term future of the company. Capital employed is helpful since it's used with other financial metrics to determine the return on a company's assets as well as how effective management is at employing capital. Capital employed efficiency is one of the intellectual capital components based on value added intellectual capital model. It is calculated by dividing value added on capital employed (Pulic, 2000).

Value Added Intellectual Coefficient (VAIC™)

This method was developed by Ante Pulić, an Austrian researcher in 1998 at the Austrian Research Center of Intellectual Capital (Pulić, 2000, 2008). The important element of the VAIC™ 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). 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™ 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)

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). 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 (Stewart, 2013). 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).

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

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* capital invested) is also known as finance charge

Value Added Intellectual Coefficient and Economic Value Added

VAIC™ indicator measures the efficiency with which a firm uses its physical, financial and intellectual capital to enhance stakeholders 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 VAIC™ 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 (Pandey, Chandwani & Navare, 2018).

Many researchers have adopted the VAIC™ model as a proxy of IC in analysing 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. For example, Ogbodo, Amahalu and Abiahu (2017); Oh, Chang and Jung (2018); Vidyarthi (2019); Anwar, Abbas, Khan and Razak (2019). However, not all studies support these results. Firer and Williams (2003); Kudlak, Szócs, 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

Resource-Based View (RBV) Theory

The resource-based theory of the firm was propounded by Wernerfelt (1984) to address the limitations of environmental models of competitive advantage and attempts to provide a link between heterogeneous resources controlled by an organization, mobility of the resources within the particular industry and the strategic or competitive advantage enjoyed by an organization. A firm's resources are used to enable it to establish strategies to improve the overall efficiency and performance of the organization and these can be quite wide ranging. The resource-based view (RBV) is a way of viewing the firm and in turn of approaching strategy. Fundamentally, this theory formulates the firm to be a bundle of resources. It is these resources and the way that they are combined, which make firms different from one another. It is considered as taking an inside-out approach while analysing the firm. This means that the starting point of the analysis is the internal environment of the organization. Resources of the firm can include all assets, capabilities, organizational processes, firm attributes, information and knowledge. In short resources can be considered as inputs that facilitate the organization to perform its activities. All resources that an organization has may not have strategic relevance. Only certain resources are capable of being an input to a value creating strategy which put the organization in a position of competitive advantage (Dejmal, 2020).

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 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.

Empirical Review

Nwaiwu and Nwaekpe (2018) examined the effect of intellectual capital reporting on corporate financial performance of 12 quoted manufacturing firms in Nigeria

from 2011- 2015. Time series data on different types of intellectual capital on debt-to-equity ratio were collected from Nigerian Stock Exchange. Descriptive statistics, Augmented Dickey – Fuller and Multiple Linear regression analysis were used in analyzing the data with the aid of E-view version 8. The econometric results indicated that intellectual capital has a significant effect on corporate financial performance; explaining about 39.4% of the variation in debt-to-equity, Human capital was found to have significant effect on financial performance. The study therefore, concluded that Human capital has a very high potency to make significant contribution to Debt-to-Equity and recommended that firms should harness the benefits accruable in external relationships, while practitioners must recognize that although human capital (HR), structural capital (ICT) and relational capital (Marketing) departments of manufacturing firms are typically disparate units that often do not integrate their services, they must attempt to reconcile their divergent views and coordinate their various processes so that a more holistic perspective on the intangible value of the firm can be more readily realized.

Saudah, Mike and Richard (2019) examined the impact of IC on management accounting practices, specifically, performance measurement and corporate performance in Nigeria. The study explored whether firms investing heavily on IC were more likely to emphasise non-financial measures. The study also examined whether the degree of IC values in these firms influence their performance. 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. The study explored both the role of management accounting information and that of the management accountant. Results suggested some evolution in performance measurement approaches due to the impact of IC and they also indicated that IC does influence corporate performance.

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. Overall, structural capital has a vital effect on firms' profitability and therefore, should be given more emphasis by companies.

Xu and Wang (2019) analyzed the relationship between intellectual capital (IC) and performance of the textile industry in China and South Korea during 2012–2017, and measured the contribution of IC sub-components to companies' performance. The fixed effect regression results showed that the aggregate IC positively affects earnings, profitability, and productivity of textile companies in China and South Korea. At the sub-components level, the contribution of capital employed efficiency (CEE) is the largest, followed by structural capital efficiency (SCE), and relational capital efficiency (RCE) in China's textile industry. In addition, Korea's textile industry relies heavily on CEE and human capital efficiency (HCE), while the contribution of RCE is relatively small.

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.

Methodology

Research Design

The research design that was employed in this study is the *ex-post facto* research design.

Population of the Study

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

Sample Size and Sampling Technique

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.

Operationalisation 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 = physical capital + financial assets

CE = Total assets – 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

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

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

Control Variables

1. Leverage: $\frac{\text{Total Debt}}{\text{Total Assets}}$
2. Firm Size: Natural logarithm of Total Assets

Table 1: Variables Definition and Measurement Units

Variable Type	Proxy	Variable Symbols	Variables Explanation
Independent Variable (Intellectual Capital)			
	Human Capital Efficiency	HCE	$\frac{\text{Value Added}}{\text{Human Capital}}$
	Structural Capital Efficiency	SCE	$\frac{\text{Value Added} - \text{Human Capital}}{\text{Value Added}}$
	Capital Employed Efficiency	CEE	$\frac{\text{Output} - \text{Input}}{\text{Total Assets} - \text{Intangible Assets}}$
	Value Added Intellectual Coefficients	VAIC	CEE + HCE + SCE
Dependent Variable			
	Economic Value Added	EVA	NOPAT – (WACC x Capital Invested)
Control Variables			
	Leverage	LEV	Total Debt/Total Assets
	Firm Size	FSZ	Natural logarithm of Total Assets

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 H_1 , H_2 , H_3 and H_4 , this study would estimate the following regression equations:

$$EVA = f(HCE, SCE, CEE) + \varepsilon$$

The specific model constructs would be:

$$EVA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 LEV_{it} + \beta_5 FSZ_{it} + \varepsilon_{it}$$

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.

β_1 , β_2 , and β_3 are the coefficients of the regression (Intellectual Capital)

EVA_{it} = Economic Value Added of firm i in period t

HCE_{it} = Human capital efficiency of firm i in period t

SCE_{it} = Structural Capital efficiency of firm i in period t

CEE_{it} = Capital Employed Efficiency 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

Data Presentation and Analysis

Table 2 Pearson Correlation Matrix

	EVA	HCE	SCE	CEE	LEV	FSZ
EVA	1.0000	0.4464	0.5278	0.0303	0.0938	0.3472
HCE	0.4464	1.0000	0.6806	0.2000	0.2652	0.6321
SCE	0.5278	0.6806	1.0000	0.2516	0.2098	0.6939
CEE	0.0303	0.2000	0.2516	1.0000	-0.1276	-0.1854
LEV	0.0938	0.2652	0.2098	-0.1276	1.0000	0.0044
FSZ	0.3472	0.6321	0.6939	-0.1854	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 HCE, SCE CEE, LEV and FSZ are positively correlated with EVA, with respective correlation coefficients of 0.4464, 0.5278, 0.0303, 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

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 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.

Summary of Findings, Conclusion and Recommendations

Findings

1. 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.

Conclusion

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 revealed that human capital efficiency, structural capital efficiency and capital employed efficiency have a significant positive relationship with economic value added of quoted service firms in Nigeria at 5% level of significance.

Recommendations

On the premise of these study findings, the following recommendation was made:

1. Strategic human resources policies must 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.

References

- [1] Adam, H. (2020). Capital employed. <https://www.investopedia.com/terms/c/capitalemployed.asp>. Accessed 24/03/2020.
- [2] Amahalu, N. N., Okoye, P. V., & Obi, J. C. (2018). Effect of sustainability reporting on economic value added of quoted brewery firms in Nigeria. *Journal of Accounting*, 7(1), 1-20.
- [3] Anwar, Z., Abbas, K., Khan, M., & Razak, D. A. (2019). Corporate sustainability reporting disclosure and financial Access: A case study of Pakistan. *Int. J. Econ. Manag. Account.* 27, 167-186.
- [4] Ayuso, S., Navarrete-Báez, F. E. (2018). How does entrepreneurial and international orientation influence SMEs' commitment to sustainable development? Empirical evidence from Spain and Mexico. *Corp. Soc. Responsib. Environ. Manag.* 25, 80-94.
- [5] Barney, J. B. (1991). The resource based view of strategy: Origins, implications, and prospects. *Editor of Special Theory Forum in Journal of Management*, 17, 97-211.
- [6] Bayraktaroglu, A., Calisir, F. & Baskak, M. (2019). Intellectual capital and firm performance: An extended VAIC model, *Journal of Intellectual Capital*, 20(3), 406-425.
- [7] Chen, J. (2019). Intellectual capital. https://www.investopedia.com/terms/i/intellectual_capital.asp. Retrieved 11/04/2020
- [8] Chukwu, G. J., Ugo, C. C. & Osisioma B. C. (2019). Market valuation of human capital in Nigerian banks, *International Journal of Academic Research in Accounting, Finance and Management Sciences* 9 (1), 21-29.

- [9] Corner, K. R. (1991). A historical comparison of resource-based view and five schools of thought within industrial organization economics. Do we have a new theory of the firm? *Journal of Management*, 17(1), 121-154.
- [10] Dabić, M., Lažnjak, J., Smallbone, D., & Švarc, J. (2018). Intellectual capital, organisational climate, innovation culture, and small medium enterprises performance: Evidence from Croatia. *J. Small Bus. Enterp. Dev.* 64, 249-257.
- [11] Dejmal, A. (2020). What is resource based theory. <https://study.com/academy/lesson/resource-based-theory-path-to-competitive-advantage.html>. Accessed 23/10/2020.
- [12] Dzenopoljac, V., Yaacoub, C., Elkanj, N., & Bontis, N. (2017). Impact of intellectual capital on corporate performance: Evidence from the Arab region. *J. Intellect. Cap.* 18, 884-903.
- [13] Firer, S., & Williams, M. (2003). Intellectual capital and traditional measures of corporate performance. *J. Intellect. Cap.* 4, 348-360.
- [14] Goergen, M., Chahine, S., Wood, G., & Brewster, C. (2016). Public listing, context and CSR: The effects of legal origin. *J. Comp. Int. Manag.* 19, 47-73.
- [15] Gupta, K., Goel, S. & Bhatia, P. (2019). An analysis of intellectual capital and firms' profitability: with reference to Indian it companies. *Management Review* 37(2), 77-91.
- [16] Hayes, A. (2020). Capital employed. <https://www.investopedia.com/terms/c/capitalemployed.asp>. Accessed 24/03/2020
- [17] Intarakumnerd, P. (2017). Human resource management and coordination for innovative activities in production networks in Asia: A synthesis. *Asian J. Technol. Innov.*, 25, 199-205.
- [18] James, C. (2019). What is economic value added (EVA)? <https://www.investopedia.com/terms/e/eva.asp>. Retrieved 23/09/2019.
- [19] Janošević, C. S., Dženopoljac, V., & Bontis, N. (2013). Intellectual capital and financial performance in Serbia. *Knowl. Process Manag.* 20, 1-11.
- [20] Jordão, R. V., & De-Almeida, V. R. (2017). Performance measurement, intellectual capital and financial sustainability. *J. Intellect. Cap.* 18, 643 - 666.
- [21] Kao, E. H., Yeh, C. C., Wang, L. H., & Fung, H. G. (2018). The relationship between CSR and performance: Evidence in China. *Pac. Basin. Financ. J.* 51, 155-170.
- [22] Kudlak, R., Szócs, I., Krumay, B., & Martinuzzi, A. (2018) The future of CSR-selected findings from a Europe-wide Delphi study. *J. Clean Prod.* 183, 282-291.
- [23] Lee, L. W., Tang, Y. M., Yip, L. S., & Sharma, P. (2018). Managing customer relationships in the emerging markets-guanxi as a driver of Chinese customer loyalty. *J. Bus. Res.* 86, 356-365.
- [24] Li, K., & Lin, B. (2017). Economic growth model, structural transformation, and green productivity in China. *Appl. Energy*, 187, 489-500.
- [25] Mačerinskienė, I. & Simona, S. (2011). Intellectual capital as the main factor of company's value added. *Journal of Intellectual Economics*, 5(4), 560-574.
- [26] Martín de Castro, G., Delgado-Verde, M., López-Sáez, P., Navas-López, J. E. (2011). Towards an intellectual capital-based view of the firm: Origins and nature. *J. Bus. Ethics*, 98, 649-662.
- [27] Matos, F., Vairinhos, V. M., & Dameri, R. P. (2017). Increasing smart city competitiveness and sustainability through managing structural capital. *J. Intellect. Cap.* 18, 693-707.
- [28] Ogbodo O. C., Amahalu, N. N., & Abiahu, M. C. (2017). Effect of intellectual capital on financial performance of quoted deposit money banks in Nigeria. *Journal of Global Accounting*, 5(1), 114-125.
- [29] Mocciaro, L. D., Picone, P. M. & Minà A. (2012). Bringing strategy back into financial systems of performance measurement: Integrating EVA and PBC, *Business System Review*, 1(1), 85-102.
- [30] Nwaiwu, J. N. & Nwaekpe, U. C. (2018). Webometric analysis of intellectual capital reporting and corporate financial performance in Nigeria. *International Journal of Innovative Finance and Economics Research* 6(1), 75-98.
- [31] Oh, W. Y., Chang, Y. K., & Jung, R. (2018). Experience-based human capital or fixed paradigm problem? CEO tenure, contextual influences, and corporate social (ir) responsibility. *J. Bus. Res.* 90, 325-333.
- [32] Ozkan, N., Cakan, S., & Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review*, 17(3), 190-198.
- [33] Pal, K., & Soriya, S. (2012). IC performance of Indian pharmaceutical and textile industry. *J. Intellect. Cap.* 13, 120-137.
- [34] Pandey, A., Chandwani, R., & Navare, A. (2018). How can mindfulness enhance moral reasoning? An examination using business school students. *Bus. Ethics*, 27, 56-71.
- [35] Penrose, E. T. (1959). *The theory of the growth of the firm*, New York: Wiley.
- [36] Phusavat, K., Comepa, N., Sitko-Lutek, A., & Ooi, K. B. (2011). Interrelationships between intellectual capital and performance: Empirical examination. *Ind. Manag. Data Syst.* 111, 810-829.
- [37] Pulic, A. (1998). Measuring the performance of intellectual potential in knowledge economy. *A paper presented at 2nd World Congress on Measuring and Managing Intellectual Capital*, McMaster University, Hamilton.
- [38] Pulic, A. (2000). VAIC - An Accounting tool for IC management. *International Journal of Technology Management*, 20(5-8), 702-714.
- [39] Pulic, A. (2002). Do we know if we create or destroy value? Retrieved from: <http://www.vaic-on.net> (as at 20.10.2019)
- [40] Pulic, A. (2008). The principles of intellectual capital efficiency-A brief description. *Croatian Intellectual Capital Center, Zagreb*, 76.

- [41] Sardo, F., & Serrasqueiro, Z. (2018). Intellectual capital, growth opportunities, and financial performance in European firms: Dynamic panel data analysis. *J. Intellect. Cap*, 19, 747-767.
- [42] Saudah, S., Mike, T. & Richard P. (2019) The implications of intellectual capital on performance measurement and corporate performance. <http://iranarze.ir/wpcontent/uploads/2019/05/9556-English-IranArze.pdf>. Retrieve on 16/02/2020.
- [43] Sherry, Z. (2016). What Is capital efficiency and why is it important? <https://medium.com/@zachsherry/what-is-capital-efficiency-and-why-is-it-important-c01b98bfe13b>. Retrieved 30/03/2020
- [44] Si, X. (2019). Literature review on the relationship between intellectual capital and enterprise performance. *Modern Economy*, 10, 386-398.
- [45] Smriti, N. & Das, (2018). The impact of intellectual capital on firm performance: a study of Indian firms listed in COSPI. *Journal of Intellectual Capital*, 19(5), 935-964.
- [46] Stewart, B. G. (2013). *Best-practice economic value added*. John Wiley & Sons.
- [47] Tarigan, J., Listijabudhi, S. Hatane, S. E. & Widjaja, D. C. (2019). The impacts of intellectual capital on financial performance: An evidence from Indonesian manufacturing industry. *Indonesian Journal of Business and Entrepreneurship*, 5(1), 65-76
- [48] Tiwari, R., & Vidyarthi, H. (2018). Intellectual capital and corporate performance: A case of Indian banks. *Journal of Accounting in Emerging Economies*, 8(1), 84-105.
- [49] Vidyarthi, H. (2019). Dynamics of intellectual capitals and bank efficiency in India. *Serv. Ind. J*, 39, 1-24.
- [50] Wernerfelt, B. (1984). The resource-based view of the firm. *Strategic Management Journal*, 5(2), 171-180.
- [51] William F., Gaetano, M. & Giuseppe, N. (2019). The impact of intellectual capital on firms' financial performance and market value: Empirical evidence from Italian listed firms. *African Journal of Business Management*, 13(5), 147-159,
- [52] Xu, J., & Wang, B. (2018). Intellectual capital, financial performance and companies' sustainable growth: Evidence from the Korean manufacturing industry. *Sustainability*, 10, 4651.
- [53] Xu, J., & Wang, B. (2019). Intellectual capital and financial performance of Chinese agricultural listed companies. *Custos Agronegocio Line*, 15, 273 - 290.

7. Stanbic IBTC Plc
8. Sterling Bank Plc
9. Union Bank Plc
10. United Bank for Africa Plc
11. Unity Bank Plc
12. Wema Bank Plc
13. Zenith Bank Plc

II. Insurance

1. Aiico Insurance
2. Cornerstone Insurance
3. Guinea Insurance
4. International Energy Insurance
5. Lasaco Assurance
6. Law Union and Rock Insurance
7. Mutual Benefits Assurance
8. N. E. M Insurance
9. Niger Insurance
10. Regency Alliance Insurance
11. Sovereign Trust Insurance
12. Staco Insurance
13. Wapic Insurance

III. Health Care Sector

1. Eko corp
2. Evans Medical
3. GlaxoSmithKline Nigeria
4. May & Baker Nigeria
5. Neimeth International Pharmaceuticals
6. Nigeria-German Chemical
7. Pharma-Deko

IV. Information Communication and Technology

1. Chams Plc
2. Courteville Business Solutions Plc
3. E-Tranzact International Plc
4. NCR Nigeria Plc
5. Tripple Gee & Company Plc

V. Printing and Publishing

1. Academy Press
2. Learn Africa Plc
3. Studio Press Nigeria Plc
4. University Press Plc

VI. Media and Entertainment

1. Daar Communication Plc

VII. Transportation

1. Associated Bus Company

VIII. Finance and Leasing

1. C & I Leasing Plc

IX. Hospitality

1. Capital Hotel Plc
1. Ikeja Hotel Plc

X. Electrical and Electronic Technologies

1. Interlinked Technologies

XI. Cargo Handling Service

1. Nigerian Aviation Handling Company Plc

XII. Automobile/Auto Parts

1. RT Briscoe

XIII. Courier & Freight

1. Red Star Express Plc

Appendix I

A. Sample Size

I. Banking

1. Access Bank Plc
2. Eco Bank Plc
3. FCMB Plc
4. Fidelity Bank Plc
5. First Bank Plc;
6. Guarantee Trust Bank Plc