Human Capital Efficiency and Economic Value Added Of Quoted Firms in Nigeria

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ABSTRACT
This study evaluates the relationship between Human Capital Efficiency and Economic Value Added of quoted service firms in Nigeria from 2010-2019. Ex-Post Facto research design was adopted for the study. A sample size of fifty-one (51) firms was selected from population of eighty two (82) firms listed on the Nigeria stock exchange. Data were sourced from 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. 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. Descriptive statistics and Panel Least Square (PLS) Regression Analysis were employed to test the hypothesis. The study revealed that human capital 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. Consequent upon the positive relationship firms should invest more in Human Capital Efficiency to improve performance. Also, firms should endeavor to recruit and employ competent professionals with great skills and competencies to motivate employees to give their best.
Keywords: Human Capital Efficiency, Economic Value Added and Leverage

I.   INTRODUCTION
In recent years, the vision of companies has changed considerably. Recent studies have attributed vital importance to knowledge management and intellectual capital reporting (ICR) as drivers for the creation of firm value (Kesse & Pattanayak, 2019). The importance of the interaction between physical assets and intellectual capital could contribute to two basic explanations: not only does the value of the firm depend on tangible and financial capital, but the efficiency of equity markets also depends on the efficiency of the intellectual capital employed.

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 organization 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 organizations that to survive in business in this complex and dynamic world, adequate attention must be paid to the intellectual capital base of the firm. Gone are the days when firms focus only on their physical capital with little or no attention to their intellectual capitals and still post huge profits. Competition in business today has become so intense that managers utilize every resource at their disposal to edge others out of business. Intellectual capital has also become an important business resource that organizations can leverage on to gain competitive advantage. Vidyarthi (2018) discovers that enterprises, which have managed their intellectual capital better, had achieved stronger competitive advantage than the other enterprises. Tran and Vo (2018) opine that human capital, which is an integral part of intellectual capital, has been recognized as one of

the key determinants of growth today in any business enterprise.

Intellectual capital is of substantial and growing importance in innovation and productivity growth, enterprise competitiveness and economic performance. Intellectual capital comprises a number of components, including R&D, technology and intellectual property rights; human resources; organizational and workplace structure; marketing, customer and supplier networks; and software. However, these components are often poorly identified and measured, information is collected in widely different ways, and financial accounting and reporting practices in general fail to recognize them as assets. Where non-financial information is available, it is ad hoc, difficult to verify, and not comparable across companies or countries. The resulting gap in transparent, reliable and accurate information interferes with the effective management of intellectual capital, distorting the allocation of resources among different forms of intellectual capital, and between intellectual and other forms of capital.

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 variable gap, methodological gap, sectorial gap and currency gap in literature which this study tends to bridge. In an attempt to closing the variable gap, this present study focused on Economic value added (EVA) which is a contemporary accounting measurement tool as against prior studies that focused on traditional/conventional accounting tools such as return on investment (ROI), return on assets (ROA), return on equity (ROE), return on sales (ROS) and earnings per share. The methodological gap was closed by employing multicollinearity and heteroscedasticity tests which previous studies failed to employ. 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. This study evaluates the relationship between Human Capital Efficiency and Economic Value Added of quoted service firms in Nigeria

II. REVIEW OF RELATED LITERATURE
Human Capital Efficiency

Human capital is the most important asset of an organization and a source of innovation and strategic renewal. Human capital is a sum of technical expertise, leadership ability, risk-taking, and problem solving ability (Xiao, Pan & Liu, 2018). Human capital is an intangible asset or quality not listed on a company's statement of financial position. It can be classified as the economic value of a worker's experience and skills. This includes assets like education, training, intelligence, skills, health, and other things employers' value such as loyalty and punctuality (Will, 2019). Human capital is the economic value of the abilities and qualities of labor that influence productivity. These qualities include higher education, technical or on-the-job training, health, and values such as punctuality (Kenton, 2019). Human capital is the stock of habits, knowledge, social and personality attributes (including creativity) embodied in the ability to perform labour so as to produce economic value. The concept of human capital recognizes that not all labor is equal. But employers can improve the quality of that capital by investing in employees - the education, experience, and abilities of employees all have economic value for employers and for the economy as a whole (Goldin, 2019).
Human capital is unique and differs from any other capital. It is needed for companies to achieve goals, develop and remain innovative. Companies can invest in human capital for example through education and training enabling improved levels of quality and production. Human capital is important because it is perceived to increase productivity and thus profitability. So the more a company invests in its employees (i.e., in their education and training), the more productive and profitable it could be (Pettinger, 2019). Since human capital is based on the investment of employee skills and knowledge through education, these investments in human capital can be easily calculated (Tejvan, 2019). Human Resource managers can calculate the total profits before and after any investments are made. Any return on investment (ROI) of human capital can be calculated by dividing the company's total profits by its overall investments in human capital. For example, if Company X invests $2 million into its human capital and has a total profit of $15 million, managers can compare the ROI of its human capital year-over-year (YOY) in order to track how profit is improving and whether it has a relationship to the human capital investments (Tejvan, 2019).
Human capital is the most important asset that exists within a firm. It represents the human factor in an organization where by combination of

intelligence, skills, knowledge, aptitudes and expertise that gives the organization its distinctive character which those traits contributing to production and profitability, thus improve organizational performance (Andreeva & Garanina, 2016; 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. The Value Added Intellectual Coefficient (VAIC^{TM}) has been introduced by Ante Pulic which can be used to measure the efficiency of intellectual capital within a company. The introduction of these monetary intellectual capital measurement methods provides new opportunities for companies and their stakeholders. This is because it provides a concrete basis for comparing the intellectual capital of different companies (Maditinos, Chatzoudes, Tsairidis, Therious, 2011; Lin, Edvinsson, Chen & Beding, 2013). 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).

Human Capital Efficiency and Economic Value Added

Human Capital has long been acknowledged to be an important factor for the productivity of individuals and more recently has been increasingly identified as a factor influencing the competitiveness of firms (Krsti´c, & Boni´c, 2016; Asiaei & Jusoh, 2017). In today's knowledge based economy, many researchers claim that "People are our greatest asset". According to Cohen, Naoum and Vlismas, 2014), people are the most powerful factor in value creation of every corporation. Henry (2013) opined that significant increase in knowledge of Human Capital is considered as an effective tool for achieving sustainable competitive advantage. More so, for any tangible asset to add value in any organization it will need to be put to use by the human asset of

such organization. Hence, to develop a competitive advantage, it is important that firms truly leverage on the workforce as a competitive weapon to actualize the firm's objective. St-Pierre and Audet (2011) argue that the ability of a corporate organization to successfully implement business strategies solely depends on efficient use of intangibles asset, particularly Human Capital. According to Sardo and Serrasqueiro (2018), the degree to which employees contributes to effective implementation of the organization strategy is linked to Human Capital performance. Hence, they believed that Human Capital performance is indeed performance behaviors that affect customers buying experience and one can conclude that it is the basis of the company's financial performance. HCE measures the value added by the human resources of an organization (Parham & Heling, 2015).

Previous studies have shown that there is a significant positive relationship between human capital efficiency and organizational performance (Kamal, Mat,Rahim, Husin & Ismail, 2012; Iranmahd, Moeinaddin, Shahmoradi & Heyrani, 2014; Arshad, Noor & Yahya, 2015; Lee, Tang, Yip & Sharma, 2018; Shah, 2019). On the other hand, Pandey, Chandwani and Navare (2018) analyzed the relationship between intellectual capital and the performance of pharmaceutical and software companies in India. Based on 80 companies, the study concluded that there is a significant negative relationship between intellectual capital and productivity. Yusuf (2013) investigated the relationship between human capital efficiency and financial performance of Nigerian banks. The study concluded that efficient utilization of human capital does not have any significant impact on the return of equity of banks.

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).

Review of Empirical Studies
        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. The Pulic's Value Added Intellectual Coefficient (VAIC) was employed to measure the IC together with the measurements of value creation efficiencies of capital employed, human capital, and structural capital of selected firms. Pearson's correlation analysis and constructed regression models were used to investigate the said relationships. Results of the main analysis showed that IC was positively associated with firm performance (market-to-book value) and investor response. Yu, Ng, Wong, Chu and Chan (2010) measured the relationship between intellectual capital (IC) performance of Hong Kong companies and business performance. Audited accounting data were collected from the constituent companies of Hang Seng Index in Hong Kong Stock Exchange between 2005- 2008 in order to compute a set of IC efficiency indexes based on VAIC™. Four accounting ratios: market-to-book value (MB), return on assets (ROA), asset turnover (ATO) and return on equity (ROE) were used as proxies for measuring business performance. VAIC™ and its associated indexes, and the accounting ratios of sample companies were submitted to regression analysis for the detection of their associations. Components of VAIC™ were found to be able to predict a substantial variance in

business performance. In addition, Structural Capital Efficiency (SCE) has an effect on market valuation as measured by MB as well as profitability as measured by ROE. Negative correlations were observed between Human Capital Efficiency (HCE) and the financial indicators which, perhaps, were due to the existence of a gap between the traditional accounting perspective and value creation perspective which is central to the VAIC™ methodology in measuring IC. Arabi and Abdalla (2013) empirically investigated the impact of human capital on economic growth in Sudan for the period 1982-2009 by using a simultaneous equation model that links human capital i.e. school attainment; and investment in education and health to economic growth, total productivity, foreign direct investment, and human development index. Based on three-stage least squares technique, the empirical results of the study showed that quality of the education has a determinant role in the economic growth; health quality factor has a positive impact on economic growth as expected and total factor productivity which mainly represents the state of technology has adverse effect on economic growth and human development due to the obsolete and old fashion technology. 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. The appropriate value of EVA differs from organizations to organizations depending upon different human resource practices, size, and nature and planned outcomes of the business. The study found that human resource practice improves firm value. Razafindrambinina and Santoso (2013) examined the relationship between intellectual capital and firm performance. The study used panel data from publicly listed non-financial institutions on the Jakarta Stock Exchange. The study used 191 publicly listed companies on the Jakarta Stock Exchange from 2009 to 2010. Using multiple regression technique, the study found no significant relationship between intellectual capital and firm performance. Amin, Aslam and Makki (2014) discovered the impact of intellectual capital (IC) on financial performance of pharmaceutical firms in Pakistan. Quantitative data of listed pharmaceutical firms were collected from the audited annual reports for the period 2009 to

2013. Pulic (2004) IC model was used to measure the intellectual capital. To measure the financial performance, return on assets, return on equity, earnings per share were used. Structural and measurement model of the study was assessed by using partial least square (PLS); a structural equation modeling technique. Results showed significant positive impact of IC on financial performance. Ezejiofor, Nwakoby and Okoye (2015) ascertained the effect of Human Resource Management on performance of business organization. Survey research design was employed and data were collected and analyzed with five point Liker's scale. Simple regression analysis was used to test the hypothesis. The study found that Human Resource Management has effect on the performance of business organization. This has to do with training and development, good planning system and proper management as a motivator. Isanzu (2015) investigated the effect of intellectual capital on financial performance of banks operating in Tanzania for the period of four years from 2010 to 2013. The study used Value Added Intellectual Capital model (VAICTM) in determining intellectual capital and its three major components like Human Capital Efficiency (HCE) Structural capital efficiency (SCE) and Capital Employed Efficiency (CEE). The regression results revealed that Intellectual capital has a positive relationship with financial performance of banks operating in Tanzania and also when the VAICTM was divided into its three components it was discovered that the financial performance was positively related to Human capital efficiency and Capital employed efficiency but was negatively related to Structural capital efficiency. Onyekwelu and Ubesie (2016) examined the effect of Intellectual Capital(IC) on corporate valuation of firms quoted in Nigeria. The study adopted the Panel Research Design and used Time Series and Cross-Sectional Data. Data covered a ten- year period (2004-2013). Simple Random Sampling was employed in selecting firms for the study. Data were sourced from the firms' annual financial statements using content analysis approach. Market valuation data were sourced from the Nigerian Stock Exchange. Multiple Regression and Correlation Analysis were used on the data at 5% level of significance. E-View Statistical Tool version 8.0 was used in the analysis. The results reveal that Human Capital Efficiency has a positive and significant effect on Market/Book Value. SCE has a negative and insignificant effect on M/BV; CEE has negative and significant effect on M/BV; positive and insignificant effect on EPS. Ezejiofor, John-Akamelu and Iyidiobi (2017) examined the

adoption of Human Resource Accounting on the Profitability of Corporate Organizations. Exploratory research design and time series data were adopted for this study. Data for the study were collected from selected ten (10) commercial banks in Nigeria. Data collected were analyzed and tested with t-test statistical tool with aid of SPSS version 20.0 version. The study revealed that the study revealed that increase in staff salary has positive effect on organizational profitability, also that the level of increment in staff has influence on organizational profitability. Onyekwelu, Okoh and Iyidiobi (2017) appraised the effect of intellectual capital on financial performance of firms in Nigeria using the banking industry for the period of 10 years (2004-2013). The study used the Value Added Intellectual Coefficient (VAIC) to ascertain the extent that intellectual capital indices affect financial performance of three banks. Data were generated from annual reports and accounts of these banks as well as data from the publications of the Nigerian stock exchange (NSE) and analyzed using regression tool. The study used Return on Asset (ROA) to measure financial performance. The study indicated that IC has a positive and significant effect on banks' financial performance but some were not significant. The results further showed that the banks were statistically different in both the intellectual capital and its financial performance indicators. Nwaiwu and Aliyu (2018) empirically examined the relationship between intellectual capital reporting and measures of financial performance of quoted banks in Nigeria from 2010.-2016. The study adopted ex-post facto research design. Data used in the study were collected from the published annual financial statements of fifteen (15) commercial banks' websites and the Nigeria The study employed OLS regression tool to analyze the data with the aid of SPSS version 23 and E-view 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. It further depicted that Structural Capital Efficiency Index significantly related to return on investment. The study concluded that intellectual capital has not fully related to the financial performance of quoted commercial banks in Nigeria. Hatane, Wedysiage, Angeline and Saputra (2018) observed the impact of Intellectual Capital Disclosure (Human Capital Disclosure, Structural Capital Disclosure, and Relational Capital Disclosure), Firm Size and Leverage towards the firm value (measured by Tobin's Q). The study examined 36 Indonesia's listed companies from infrastructure, utility, and

transportation industry in 5 years period, from 2013 to 2017. The periods that were chosen in order to differentiate the performance of 2 years before and 3 years of Joko Widodo's era (2014-2018). Various results were found from the individual tests. None of the components from ICD has an influence on firm value during the pre-Jokowi's era. The negative effect of RCD on firm value was found without differentiating the presidential era. In addition, the negative response from firm value was found when the interaction of ICD and the time period was increasing. 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 William, Gaetano, and Giuseppe (2019) examined the effect of Intellectual Capital (IC) on financial performance of Italian listed firms. In the study, the Valued Added Intellectual Coefficient (VAIC) was employed as a measure of IC to investigate the relationship between IC, firms' financial performance and market value. The empirical investigation was developed by using data drawn from a sample of 135 Italian listed companies 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. However, when considering its components, only Human Capital efficiency showed a positive effect on firms' financial performance while Structural Capital efficiency and Capital Employed efficiency exhibit a negative effect. Astonishingly, each of the individual IC components negatively influences firms' market value. Saiful and Asfarawenti (2019) examined the influence of intellectual capital (IC) on bank performance measured by ROA, ROE and NIM. The study explored purposive sampling methods. 10 Islamic banks and

30 Conventional banks were selected as a sample for the study for the period 2012-2016. The study found that IC had positive effect on bank performance that measured by ROA, ROE and NIM. The study showed that HCE and CEE had positive effect on bank performance that measured by ROA, ROE and NIM. Xu and Liu (2019) explored the value creation effect of intellectual capital on corporate performance of energy companies. The listed renewable energy companies were selected 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. Ezenyilimba, Ezejiofor, and Afodigbueokwu (2019) investigated whether the use of Total Quality Management practices contributed to higher quality output and lower costs. The data was collected using questionnaires and presented in a tabular format, with the t-test performed using the Statistical Package for Social Science (SPSS) version 20.0. the outcome of the result shows that the application of Total Quality Management practices has assisted in achieving improved quality output and reduced cost. Yao, Haris, Tariq, Javaid, and Khan (2019) examined the impact of IC on the performance of 111 Pakistani financial institutions (PFIs) over the period 2007–2018. Two IC measures; value-added intellectual coefficient (VAIC) and modified value-added intellectual coefficient (MVAIC), were applied to examine the impact of IC on profitability and productivity. Robust results from the fixed effect regression and generalized method of momentum affirmed the inverted U-shaped relationship between IC and performance, suggesting that the increase in IC performance of PFIs increases their profitability and productivity up to a certain level, and after that, a further increase in IC performance decreases profitability and productivity. The results further suggested that human capital was the most influencing intellectual resource which produces higher intellectual efficiencies and increased the performance significantly. Chukwu, Ugo, and Osisioma (2019) examined the effect of human capital on the market value of banks in Nigeria, using data on three proxies of human capital related to remuneration and staff strength. Relevant financial statement data

for the period 2010 to 2014 were extracted from the annual reports and accounts of fourteen banks listed on the Nigerian Stock Exchange. Results of regression of stock price on the human capital indicators showed that only one variable – the proportion of highly paid employees - had a significant effect on the market value of firms. The findings suggested that investors' confidence increased with the strength of valuable stock of human capital in the payroll of banks. Filippo, Nicola and Michele (2019) examined the impact of intellectual capital disclosure quality in the integrated reports on firm performance. The empirical research was based on a sample of 45 integrated reports in Croatia from 2015-2017 using multiple regression analysis. The results confirmed the existence of a significant and positive association between the intellectual disclosure quality and the firm performance.

The justification or otherwise for the place of knowledge also known as intellectual capital in driving the earnings and indeed other corporate value indices of firms has constituted a challenging academic puzzle in recent years . 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.

III. 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 casual 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.

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. Such data extracted include: Revenues, total assets, shareholders fund, total debt, staff cost for the period as well as other relevant ratios that would be required by a particular variable.

Independent Variables
Intellectual capital which is the independent variable would be proxied into Capital Employed Efficiency (CEE):
- 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.

$HCE = VA/HC$

Dependent Variable
Economic Value Added (EVA) served as the dependent variable of this study.
EVA = Net Operating Profit after Tax - (Capital Invested x 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 x 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
i. Leverage: $\dfrac{\text{Total Debt}}{\text{Total Assets}}$

ii. Firm Size: Natural logarithm of Total Assets

Model Specification
The model for this study was adapted from Pulic (2000):
$ROA = \beta_o + \beta_1 CEE + \beta_2 SCE + \beta_3 HCE + \varepsilon$
Where:
ROA = Return on Assets
CEE = Capital Employed Efficiency
To test H_1, this study would estimate the following regression equations:

$EVA = f(HCE) + \varepsilon$
The specific model constructs would be:
$EVA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 LEV_{it} + \beta_3 FSZ_{it} + \varepsilon_{it}$ - - - -
  i

Thus:

Where:
ε_{it} is the error term capturing other explanatory variables of the firm not explicitly included in the model.
β_o is the intercept of the regression.
$\beta_1, \beta_2, \beta_3$ and β_4 are the coefficients of the regression (Intellectual Capital)
EVA_{it} = Economic Value Added of firm í in period t
HCE_{it} = Human capital efficiency of firm í in period t
LEV_{it} = Leverage of firm í in period t
FSZ_{it} = Firm Size of firm í in period t
í = Individual firms
t = time periods

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, skweness, 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:** which is a good measure of relationship between two variables, tells us about the strength of relationship and the direction of relationship as well.
ii. **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.

iii. Granger Causality Test: was utilized to ascertain the causation that runs between the study variable

Decision Rule

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

IV. DATA ANALYSIS
Table 1 Descriptive Statistics of Study Variables

	EVA	HCE	LEV	FSZ
Mean	0.1150	3.8500	4.9330	10.8610
Median	0.1100	2.4100	4.7000	10.8000
Maximum	0.1300	9.6000	10.5800	12.0200
Minimum	0.1000	1.2200	1.4600	9.9300
Std. Dev.	0.0097	3.1273	2.8716	0.7689
Skewness	0.3828	0.8958	0.8672	0.1953
Kurtosis	2.1626	2.1048	2.7516	1.6403
Jarque-Bera	15.9500	93.4138	7.5457	14.2339
Probability	0.0003	0.0000	0. 0229	0.0005
Sum	1.1500	38.5000	49.3300	58.6100
Sum Sq. Dev.	0.0009	88.0184	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, VAIC stood at 4.4640 with a standard deviation of 3.3677, a maximum of 10.5400 and a minimum of 1.4200.

Test of Hypotheses

Ho$_1$: There is no significant relationship between Human Capital Efficiency and Economic Value Added of quoted service firms in Nigeria

H$_1$: There is significant relationship between Human Capital Efficiency and Economic Value Added of quoted service firms in Nigeria

Table 2: Heteroskedasticity Test between HCE and EVA
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.866678	Prob. F(3,6)	0.5081
Obs*R-squared	3.023284	Prob. Chi-Square(3)	0.3880
Scaled explained SS	0.817359	Prob. Chi-Square(3)	0.8453

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/28/20   Time: 20:01
Sample: 2010 2019
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001149	0.000792	1.451223	0.1969
HCE	2.46E-05	1.95E-05	1.261664	0.2539
LEV	-1.63E-05	1.18E-05	-1.381217	0.2164

FSZ	-0.000101	7.65E-05	-1.319539	0.2351
R-squared	0.302328	Mean dependent var		6.77E-05
Adjusted R-squared	0.246507	S.D. dependent var		8.75E-05
S.E. of regression	8.95E-05	Akaike info criterion		-15.51590
Sum squared resid	4.80E-08	Schwarz criterion		-15.39487
Log likelihood	81.57952	Hannan-Quinn criter.		-15.64868
F-statistic	0.866678	Durbin-Watson stat		1.204121
Prob(F-statistic)	0.508089			

Source: E-Views 10.0 Regression Output, 2020

Interpretation of Diagnostic Test

Homoscedasticity means that the variance of error or residuals is the same across all levels of the independent variables. When the variance of errors differs at different values of the independent variable, then, heteroscedasticity is indicated. The presence of unequal variances (heteroscedasticity) can create problems for multivariate analysis. When heteroscedasticity is marked, it can lead to serious distortions of findings and seriously weaken the analysis.

Homoscedasticity rule states that:

- Ho : The residuals are homoscedastic

- Ha : 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 0.314417 in table 2, 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 3: Panel Least Square Regression Analysis testing the relationship between HCE and EVA

Dependent Variable: EVA
Method: Panel Least Squares
Date: 11/26/20 Time: 14:11
Sample: 2010 2019
Periods included: 10
Cross-sections included: 51
Total panel (balanced) observations: 510

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.399648	0.094219	4.241677	0.0000
HCE	0.224076	0.003131	6.130165	0.0000
LEV	-0.012724	0.003346	-0.216269	0.8289
FSZ	-0.020893	0.009511	-2.196721	0.0285
R-squared	0.665817	Mean dependent var		0.206362
Adjusted R-squared	0.639982	S.D. dependent var		0.228340
S.E. of regression	0.227197	Akaike info criterion		-0.118185
Sum squared resid	26.11899	Schwarz criterion		-0.084974
Log likelihood	34.13711	Hannan-Quinn criter.		-0.105164
F-statistic	13.10616	Durbin-Watson stat		1.862304
Prob(F-statistic)	0.000000			

Source: E-Views 10.0 Regression Output, 2020

Interpretation of Regression Result

Table 3 proves that the functional relationship between the dependent and independent variables is: EVA = 0.399648 + 0.224076HCE - 0.012724LEV - 0.020893FSZ

The implication of the regression model is that a unit increase in HCE will exert 22% increase

in EVA, while a unit increase in LEV and FSZ will cause EVA to reduce by 1.3% and 2,1% respectively. The table revealed that HCE is positively and significantly correlated with the EVA of quoted service firms in Nigeria. The beta coefficient of the variables; β_1 is 0.081080; $\beta_2 = -0.012724$; $\beta_3 = -0.020893$. The slope coefficients indicate that $X_1 = 0.0000 < 0.05$; $X_2 = 0.8289 > 0.05$; $X_3 = 0.0285 < 0.05$. A significant positive relationship exists between HCE and EVA; a non-significant negative relationship exists between LEV and EVA, while a significant negative relationship exists between FSZ and EVA. As evident in table 3, the adjusted R^2 is 0.639982. This means that approximately 64% of the variations in

the sampled firms' EVA can be explained jointly by HCE, LEV and FSZ. The overall regression result with a P-Value = 0.000000 evidenced that HCE exhibits a significant positive relationship with EVA.

V. DECISION

The regression result with P-value = 0.000000 provides a basis for accepting the alternative hypothesis, which states that there is a significant positive relationship between Human Capital Efficiency and Economic Value Added of quoted service firms in Nigeria at 5% level of significance.

Table 4: Pairwise Granger Causality Test showing the Causality between HCE and EVA

Pairwise Granger Causality Tests
Date: 11/26/20   Time: 14:54
Sample: 2010 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
HCE does not Granger Cause EVA	408	17.2271	7.E-08
EVA does not Granger Cause HCE		0.95457	0.3858

Source: E-Views 10.0 Causality Output, 2020

Interpretation of Diagnostic Test

Table 4.6 shows that a unilateral causality runs from HCE to EVA at a P-value of 0.0000 which is statistically significant at 5% level. Consequently, the null hypothesis is rejected for

the alternative which states that HCE has a significant positive relationship with 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 on EVA

Dependent Variable: EVA
Method: Panel Least Squares
Date: 11/26/20   Time: 14:57
Sample: 2010 2019
Periods included: 10
Cross-sections included: 51
Total panel (balanced) observations: 510

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.368964	0.130613	-2.824854	0.0049
HCE	0.000525	0.002629	2.199631	0.0283
LEV	0.003581	0.004271	0.838512	0.4022
FSZ	0.056758	0.012948	4.383682	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.496325	Mean dependent var		0.206362

Adjusted R-squared	0.437784	S.D. dependent var	0.228340
S.E. of regression	0.171211	Akaike info criterion	-0.591988
Sum squared resid	13.36690	Schwarz criterion	-0.143638
Log likelihood	204.9569	Hannan-Quinn criter.	-0.416205
F-statistic	8.478230	Durbin-Watson stat	1.662855
Prob(F-statistic)	0.000000		

Source: E-Views 10.0 Regression Output, 2020

VI. DISCUSSION, CONCLUSION AND RECOMMENDATION

This study revealed that human capital 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.

The regression results in Hypothesis revealed that HCE is positively and significantly correlated with the EVA of quoted service firms in Nigeria. The beta coefficient of the variables; β_1 is 0.081080; β_2 = -0.012724; β_3 = -0.020893. The slope coefficients indicate that $X_1 = 0.0000 < 0.05$; $X_2 = 0.8289 > 0.05$; $X_3 = 0.0285 < 0.05$. A significant positive relationship exists between HCE and EVA; a non-significant negative relationship exists between LEV and EVA, while a significant negative relationship exists between FSZ and EVA. As evident in the regression result for hypothesis 1, the adjusted R^2 is 0.639982. This means that approximately 64% of the variations in the sampled firms' EVA can be explained jointly by HCE, LEV and FSZ. The overall regression result with a P-Value = 0.000000 evidenced that HCE exhibits a significant positive relationship with EVA. The result of this study supports the works Aleša and Vasilije (2020); Xu and Wang (2019); Saruchi, Nor, Basiruddin, Abdul -Rasid and Nor (2019); Xu and Liu (2019); Saudah, Mike and Richard (2019).

Consequent upon the positive relationship between Human Capital Efficiency and Economic Value Added of all service firms under study, therefore, firms should invest more in Human Capital Efficiency to improve performance. Also, firms should endeavor to recruit and employ competent professionals with great skills and competencies to motivate employees to give their best.

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