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Original Article

Intellectual Capital, Financial Performance, and Enterprise Value of Listed Technological Companies in Nigeria

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Abstract: *The contribution and roles played by Intellectual Capital; Financial Performance on Enterprise Value have been generating a lot of attention in recent times. As a result, this study looked at the impact of financial performance and intellectual capital on the enterprise value of listed technical businesses in Nigeria. For the period from 2012 to 2020, a working population of seven out of nine enterprises was chosen. The research employed secondary data. Value Added Intellectual Coefficient (VAIC) was employed as a proxy for intellectual capital, whereas Return on Asset (ROA) and Return on Investment (ROI) were used to represent financial success. The dependent variable was Enterprise Value (EV). Control variables included firm size (FS), financial leverage (LEV), and physical capital intensity (PCI). The study's findings, which were determined using correlation and multiple regression analysis, indicate that Intellectual Capital and Leverage have a negative and significant impact on enterprise value; Return on Asset plays a negative and insignificant role; Return on Investment, Firm Size, and Physical Capital Intensity has a positive and significant role; and Return on Asset plays a negative and insignificant role. The study, therefore, recommended that firms in the Nigerian technological sector should: Expose employees to an industrial-based seminar, and training; opt for equity financing instead of debt. Similarly, firms should fully utilize their assets for operations and dispose of idle assets while proceeds from such disposal should be utilized to finance other profitable investments with a view to enhancing the firms' value.*

Keywords: *Intellectual Capital, Financial Performance, and Enterprise Value.*
JEL: L20, L25, O30, O34.

I. INTRODUCTION

With the argument that suggests that a greater portion of a firm's financial result is contributed by the company's intellectual capital than by physical and financial assets in a knowledge-based economy, there has been growing interest in and concern about the role played by intellectual capital on firm financial performance of firms as well as enterprise value in recent years. In the early l990s corporations were left with no option other than resorting to internal factors (intellectual assets) because of the strategic paradigm shift which impacts their financial performance which in turn boosts enterprise value. Since then, investment in intellectual capital assets took a new dimension. Studies all over the world are striving to test the efficacy of new theories that emerged after industry-based views and ascertain empirical evidence on the nature of the relationship between intellectual capital, financial performance, and enterprise value. Intellectual capital has been a center point of focus because of its strategic importance in every organization. Intellectual capital is a resource that can add value to an organisation and affect an enterprise's ability to compete, according to Sullivan (2000). Despite all the incredible investments made in the growth of intellectual capital, they are not mentioned anywhere in the financial statements of Nigerian enterprises. This is related to the fact that Nigeria does not have any formal accounting standards for reporting intellectual capital. However, a disclosure opportunity for intellectual capital is being thought about and anticipated with the implementation of the International Financial Reporting Standard (IFRS) 3 (a standard mandating the identification and valuation of intangible assets in company combinations). Because of the effect on enterprise value, it has become more common for financial statements of businesses to take into account the real worth of intangible or intellectual assets.

Intellectual capital is now a crucial component of any enterprise's market worth in the age of knowledge. Businesses need to have significant intangible value in order to get investors' trust. However, it may also be argued that intellectual capital can enhance firm value through share price (Feimianti & Anantadjaya, 2014), return on investment, and return on equity (Emamgholipour, Pouraghajan, Tabari, Haghparast & Shirsavar, 2013). Furthermore, in developing nations like Nigeria, where financial performance weighs more heavily than other metrics when considering investment, the importance of financial performance cannot be overlooked. The relationship between financial performance and intellectual capital has gradually grown to the point where it is necessary to examine the dynamics of intellectual capital and how it affects company value. Studies conducted in Iranian listed companies by Khanqah, Akbari and Ohanavati (2012), Eskandar (2013), Hamehkhani,

Booehani and Rarani, (2014) and Yilmaz and Acar (2018) proved the existence of positive relationship between intellectual capital, firms market value and financial performance Ample evidence abound that empirical studies have been undertaken in the area of intellectual capital to determine its influence, relation, effect or impact on financial performance and enterprise value (Chokri, Asma & Najla 2012, Irma & Elvir, 2013, Deep & Narwal 2014, Nimtrakoon, 2015, Shafi'u, Noraza & Saleh, 2017, Nwaiwu & Aliyu, 2018, Yilmaz & Acar, 2018, Ihyaul, Indra & Adi, 2020). Studies conducted in Latvia and Lithuania by Irma and Elvira (2013); Ihyaul, Indra and Adi (2020) in Indonesia, and Jian and Feng (2020).

Many studies were conducted in Nigeria as well (Shafi'u, Noraza & Saleh, 2017; Ofurum & Aliyu, 2018). However, they didn't focus on technical enterprises but rather other economic sectors including banking, manufacturing, oil and gas, and food items. They also only looked at the direct correlation between intellectual capital and financial performance or company value. The bulk of Nigerian research neglect the potential impact of financial performance and intellectual capital on firm value in the technical sector. The study made an effort to close this gap by measuring the dependent variable, adding three control variables, and measuring the domain. Therefore, by examining the operations of technical enterprises over a nine-year period (2012–2020), this research aims to close those gaps. The study is structured into five sections, including an introduction, literature review, methodology, results and discussions, and, finally, a conclusion and recommendations, in order to achieve this goal.

II. LITERATURE REVIEW

The terms intellectual capital, financial performance, and enterprise value are discussed in this section. Relevant empirical research on the effects of enterprise value, financial performance, and intellectual capital, as well as theory pertinent to the topic at hand.

A) Intellectual Capital

One of the ideas in human resource accounting that has attracted a lot of attention is intellectual capital (IC). The definitions of IC in the literature include a wide spectrum and vary in their points of emphasis, from personal to organizational traits to the knowledge that may be applied to value creation (Mouritsen, 1998). IC is the culmination of all that exists within the business and results in a competitive edge in the market. According to Stewart (1997), intellectual capital is a combination of human, structural, and customer capital. Innovation is produced by human capital, whether it be in the form of new goods and services or improved corporate operations. The knowledge that is collectively owned by the organization in terms of technologies, innovations, data, publications, strategy and culture, structures and systems, and operational practices and procedures is known as structural capital. Last but not least, customer capital refers to a company's franchise, ongoing relationships with the individuals or organizations to which it sells, as well as metrics like market share, customer retention and defection rates, and profitability per customer. Many scholars have offered comparable categorizations of the elements of intellectual capital (Edvinsson & Malone, 1997). The closest thing to intellectual capital is structural capital, which is owned by the company and is deemed to be unique. It is known as the intellectual property assets, according to Brookings (1997), and includes know-how, trade secrets, copyright, patents, and numerous design rights that serve as legal safeguards for the firm's assets.

From the aforementioned, it can be inferred that different researchers evaluate intellectual capital widely and from a variety of angles. The nature and characteristics of this asset were aligned in the following view. First, it was explained as the discrepancy between a company's book value and market value. Secondly, it was seen as an asset with nonphysical features, in the form of skills, experience, innovation, and knowledge that gives a firm a better competitive edge over others. Last but not least, it was described as a made-up asset that consists of know-how, trade secrets, copyright, a patent, and numerous design rights. It can be concluded from the above scholars' position that they all agreed on the existence and fictitious nature of the asset, but its value depends on the viewpoint and definition given to it and its measurement.

In the early stages of intellectual capital creation, researchers Brooking (1996), Stewart (1997), and Edvinsson and Malone (1997) all agreed that the three components of human capital, customer capital, and structural capital make up the majority of intellectual capital. However, Rami'rez (2010) asserts that organisational capital, structural capital, human capital, technological capital, social capital, and business process capital, or customer capital, are all elements of intellectual capital. According to a review of the literature, knowledge, employee skill, customer happiness, loyalty, policies, procedures, social value, intellectual property, industrial property, faith, ethics, and other intangible assets are all tied to intellectual capital. In light of the foregoing, intellectual capital was divided into seven crucial components. Human capital, structural capital, spiritual capital, social capital, employed capital, inventive capital, and relational capital are the seven components mentioned above. However, as stated by Pulic (2000), this study only took into account the three most important of the seven listed components. These are therefore human capital, structural capital, and employed capital.

B) Human Capital

The term "human capital," which was first used by Nobel Prize-winning economist Gary Becker (1964) to describe the value-stored knowledge and skills of US workforce members, is now referred to as the primary asset of an organization (Yang & Lin, 2009). Despite the significance of human capital for organizations, its metrics and definition are not widely agreed upon. Human capital, according to Kim, Yoo, and Lee (2010), emphasizes the economic worth of the output that people can create and exemplifies both their individual and group competencies. According to Martin's (2000) theory, human capital is found among employees who do tasks that benefit clients.

C) Structural Capital

According to Chang and Birkett (2004), structural capital refers to the cultures and structures created to enable the use and development of human and relational capital. According to Chang and Birkett (2004), structural capital is the organization's overall system and processes for problem-solving and innovation. It comprises accounting for administrative costs as well as the evaluation of the value of the knowledge that has been stored and the cycle of liquid capital. The ability of a company's structure to transform human capital invention and energy into company property and to capitalize on that innovation to generate income is known as structural capital. The basic problem-solving process and method used by an organization, as well as the accrued capital revolving rate and accounting-based value, are fully described by structural capital. The architecture that supports human capital within organizations is known as structural capital (Chen, 2009).

An organization with strong structural capital will foster an environment where human capital may be used and developed to the fullest extent possible, hence boosting its innovation capital and customer capital. Company culture, organizational structure, organizational learning, operational process, and information system are all subcategories of structural capital (Ramezan, 2011).

D) Capital Employed Efficiency

The capital employed efficiency measures how well businesses use both physical and financial capital to produce value. It reflects the calculation of value-added through one unit of a firm's investment in capital employed (both physical and financial). Therefore, capital employed efficiency accurately depicts the amount of value added produced by a firm's total capital employed expenditure. As physical and financial capital are used to help build intellectual capital and create value, capital utilized efficiency displays efficiency that both human capital efficiency and structural capital efficiency fail to take into consideration (Pulic, 2000).

E) Intellectual Capital Measurements and Models

In the last two to three decades, researchers and scholars have postulated many ideas and prepositions in a quest to give a clear measurement of intellectual capital, with the numerous researches and articles published on intellectual capital. Still, there is no standard and universal measurement. Yegane, Moazez, Nikoonesbati and Khanhossini (2013) listed 37 different models for valuation of IC as developed by scholars, which is the highest number of models ever identified by any study. But none has the ability to satisfy all purposes. Kavida and Sivakoumar cited in Sveiby, (1997) posited that there is no single comprehensive model that can satisfy all purposes, the researcher should select the model that suits his particular purpose, situation and audience Kavida and Sivakoumar (2008) broadly categorized intellectual capital into three methods, Direct Intellectual Capital (DIC), Indirect Intellectual Capital (IIC) and Scorecard (SC) methods.

The scorecard technique provides intellectual capital in graphic form, while direct intellectual capital attempts to estimate the monetary value of the organization's asset after identifying the various components of intellectual capital. Both methods have a number of drawbacks. To value intellectual capital, the indirect method uses financial statements as the source of information necessary to determine the value of Intellectual Capital of an organization The methods include: Future Growth Value (FGV), Market Value Added (MVA), Economic Value Added (EVA), Market Value to Book Value Ratio (M/B ratio) or Market Capitalization Model, Return Model (RM), Tobin’s q Ratio (Tobin Q Ratio), Value Added Intellectual Coefficient (VAIC) and Computed Intangible Value (CIV). The methods were developed by researches with the view of measuring IC.

Pulic (2000) developed Value Added Intellectual Coefficient (VAIC). The model categorized organizational assets that create value into intellectual capital and physical capital. The value added is arrived at by deducting the cost of goods or services purchased from sales revenue. Alternatively, value-added can be arrived at by adding operating profit, payroll costs for employees, and depreciation. It is worth noting that the VAIC model considers salaries and wages as investments in employees rather than expenses. This model gained wide acceptance among intellectual capital researchers like Yegane, Moaze, Nikoonesbati and Khanhossini (2013); Bita, Seyed and Nasab, (2016); Shafi’u, Noraza and Saleh, (2017);Nwaiwu and Aliyu (2018), It has three components: Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE) and Structural Capital Efficiency (SCE), when added up their total, represent VAIC.

Human Capital Efficiency (HCE) is calculated by dividing the value added by salaries and wages of employees, i.e HCE = VAIHC, where VA = sales revenue – cost of sales and HC = employees' salaries and wages. Capital Employed Efficiency (CEE) is derived from the ratio of value-added to capital employed of the organization, i.e CEE = VA/CE. Structural Capital Efficiency (SCE) is arrived at after deducting human capital from the total value-added, i.e SC = VA-HC. The SC is then divided by VA in order to arrive at SCE. Thus, SCE=SC/VA.

VAIC is then determined by summing the efficiency indicators of human, structural and capital employ efficiencies, i.e. VAIC = HCE + SCE + CEE. VAIC has a number of advantages that make it more popular among other methods of valuing intellectual capital. The approach is based on both efficiency evaluation and value generation of invisible asset and tangible asset in a company. These include simplicity, clarity, and easy extraction of data from audited financial statements of organisations, so the computations done are verifiable.

F) Financial Performance

Studies on a company's financial performance have been conducted, and several scholars from all over the world still work to define it in a way that makes sense to everyone. Financial success is arguably the most often employed dependent variable in organisational research today, according to Roger and Wright (as referenced by Ofurum & Aliyu 2018), yet it also remains one of the most ill-defined and ambiguous concepts. They added that the fight to define the meaning of performance has been going on for a long time and is not specific to one field.

Different metrics, such as the needed rate of return on capital and net operating income after taxes, can be used to assess financial success. Revenue from operations, operating income or cash flow from operations, Return on Assets (ROA), Return on Investment (ROl), Return on Equity (ROE), Earnings Before Interest and Tax (EDIT), and Value Added (VA) are a few of the financial performance measures listed by Investopedia (2013) and Financial Dictionary (2012).

Both local and international scholars have been using different proxies to measure financial performance. For instance, Orugun and Aduku, (2017), Ofurum and Aliyu, (2018), Yilmaz, and Acar, (2018), have measured financial performance with profitability (NP), Economic Value Added (EVA), Earnings Per Share (EPS), Future Growth Value (FGV), productivity (ATO), Net Profit Ratio (NPR), Cost Income Ratio (CIR), Growth in Revenue (GR), Gross Earnings (GE), Market Value and Book Value Ratio (PBR), Tobin's Q, Portfolio at Risk (PAR), productivity (ATO) and Return On Investment (ROI). However, the most commonly used measures are ROA, ROE and productivity. On the basis of a company's VAIC value, the present enterprise value of that company can be calculated. The hypothesis states that VAIC correlates with a company's market value on the stock exchange or, more generally, with its economic success as determined by Return On Assets (ROA) or Returns On Investments (ROI) (Clarke, Seng & Whiting 2010). The use of ROA and ROI in the current investigation was therefore justified.

G) Enterprise Value

The whole value of a firm is measured by enterprise value, which is sometimes used as a more thorough substitute for equity market capitalization. Companies may be easily compared using enterprise value as a metric, regardless of their financial structure. Enterprise value can be compared to the hypothetical purchase price for a company (Investopedia.com, 2020). Many people believe that enterprise value is a more accurate indicator of a firm's value than basic market capitalization since it differs significantly from that metric in several key aspects. Enterprise value offers a considerably more accurate takeover valuation because it includes debt in its calculation. For example, the value of a firm's debt would need to be paid off by the buyer when taking over a company. Many significant elements are excluded by market capitalization, such as a company's debt and cash reserves. Enterprise value, which integrates debt and cash to determine a company's valuation, is essentially a modification of market capitalization (Kennon, 2018).

Enterprise value is computed as market capitalization less total cash and cash equivalents and less debt, minority interest, and preferred shares. As shown below:

EV = Market Value of common stock +Market value of preferred equity + Market Value of debt + Minority interest – Cash and Investments

The enterprise value and market value are both reliable indicators of how investors view the future of the company. From a business with the lowest capital basis to the biggest and most prosperous business present in the stock market, the range of values in the market is immense. The values or multiples that investors assign to companies, such as price-to-sales, price-to-earnings, enterprise value-to-earnings before interest, taxes, and dividends, etc., define market value. The market worth of the company increases as valuations rise. The business cycle has a significant impact on enterprise and market value, which can fluctuate greatly over time. Values fall during bear markets that go along with recessions and rise during bull markets that are a sign of an expanding economy. Enterprise value is also influenced by a wide range of additional variables, including the way

the firm is run, its structure, the industry it works in, its profitability, its debt load, and the general market environment (Kennon, 2018).

Before taking into account the takeover premium, Enterprise Value (EV), a possible price for acquiring a firm, reveals its worth. The debt and cash levels that the buyer will also absorb are taken into consideration. This metric, which considers total market value, can be used to contrast businesses with various capital arrangements. In this manner, EV takes into account the rights to assets and interests of all owners, including those with debt and equity. EV is a more precise and thorough depiction that aids in capturing the overall value of the company. It represents the lowest price an investor would offer to buy a business.

H) Empirical Review

In order to establish a connection between intellectual capital, financial performance, and enterprise value, both local and foreign experts evaluated important empirical studies in this part.

Past research has proved that intellectual capital has a positive effect on enterprise value as measured by the share price value-added intellectual capital measured using the value-added intellectual coefficient model associates positively with the firm's value measured by the market to book value (Poraghajan, 2013), the employed capital and human capital have a positive relationship with the enterprise value (Ozer & Cam, 2017) in contrast to the results of the study conducted by Irma and Elvira, (2013) in Latvia, Lithuania and Estonia, In the case of Estonia, there is no significant correlation between Human capital, structural capital and capital employed efficiency and Enterprise value, at the same time an entirely different result was obtained in the case of Lithuania and Latvia where a positive correlation was found between capital employed efficiency, human capital efficiency and enterprise value of Baltic companies which is in line with (Ozer& Cam 2017).

Using the Pulic VAIC technique, Noradiva, Parastou, and Azlina (2016) investigated the connection between intellectual capital and corporate value. Additionally, the study looked at managerial ownership's function. Managerial ownership did not modify the relationship between intellectual capital and business value, according to Noradiva et al.'s (2016) research. The insignificant outcome, according to the researchers, demonstrated that a larger level of managerial ownership had caused the role of managerial ownership to become entrenched rather than align. Additionally, Bohdanowicz (2014) came to the conclusion that management ownership has a bad impact on HCE (Human Capital Efficiency). Bohdanowicz added that the entrenchment impact of insider ownership was to blame for the bad connection. Ozer and Cam (2017) conducted research on the moderating impact of human capital on inventive capital and business value in Turkish industrial companies. The study's findings demonstrated that enterprise value is strengthened by human capital. According to studies by Poraghajan and Abbasay (2013), Irma and Elvira (2013), and Bita et al. (2016), this is accurate.

In order to account for differences in asset sizes among organisations, Yilmaz and Acar (2018) study used the Modified Value included Coefficient (M-VAIC) and included the natural logarithm of assets. They also examined the significance of the effects of intellectual capital on financial performance and market value. According to the study's findings, multi-factor models are more effective than single-factor models at explaining financial and market performance. It also showed that financial performance explanation models deliver more accurate outcomes than market performance explanation models. Furthermore, the investigation showed that while relational and physical capital have an impact on market value and financial performance, respectively, they have little to no impact on either.

Suhenda (2015) found, in a study he conducted in Indonesia using structural equation modelling to examine the relationship between intellectual capital, enterprise value, and financial performance, that intellectual capital significantly affects profitability, market valuation, and growth, but not productivity or enterprise value. The study also discovered that market valuation has a considerable impact on enterprise value. Growth, productivity, and profitability have little impact on enterprise value. Furthermore, enterprise value is positively impacted by intellectual capital, which is affected by business performance. The findings of Ozkan et al. (2017), Yilmaz and Acar (2018), Ozkan, Cakan and Kayacan (2017), and Ofurum and Aliyu (2018) are in agreement with this finding.

In recent years, studies have focused on how intellectual capital affects financial performance and enterprise value of businesses. These studies have started to consider what factors may affect the quality or potential efficacy of the assets in influencing financial performance and enterprise value. In fact, numerous studies that took these elements into account in various sectors were carried out to assess the impact of intellectual capital on performance indicators and firm value. Studies conducted by Irma and Elvira (2013) and Sardo and Serrasqueiro, (2017) in Russian and European companies identified internal and external Intellectual Capital transformation factors to include countries' institutional factors/ economic incentive regime, company size, intellectual property protection, industry, market dynamics, and innovation system. They established that these factors, affect intellectual capital transformation into company's value particularly in European countries. Mariya, Olga and Jana (2012) also found that belonging to a particular industry affect corporate intellectual asset configuration and thus

influence its financial performance and enterprise value. When we look at the findings of Beshkooh, Maham, and Fleidarzadeh (2013), where the impact of intellectual capital varied with maturity, stagnancy, growth, and size of the 330 enterprises listed on the Tehran Stock Exchange, it is apparent that life cycle and company size have an impact on intellectual capital. Also, factors that affect individual components of intellectual capital were clearly identified by Huang (2012) to include training and development, employee participation and performance management.

The results of the earlier studies mentioned above showed a clear link between the variables, but they also suggested that further research was necessary to fully understand how intellectual capital, financial performance, and company value interact. Especially, the introduction of three control variables, also the measurement that will be adopted in measuring the dependent variable. This is due to the fact that the methodology, the domain, the proxies, as well as the role played by each variable may lead to entirely different findings from those studies and as such their findings will not be generalized. Therefore, because of this criticism other studies around the world are motivated including the current research.

I) Theoretical Framework

This study's major objective was to investigate the connections between the listed Nigerian technological businesses' intellectual capital, financial performance, and enterprise value. Due to the fact that intellectual capital is, when compared to other firm's resources, principal for achieving superior performance and competitive advantage in today's dynamic and knowledge-driven economy, two theories will serve as the foundation for this study: the knowledge-based view and the stakeholders view (Wiklund & Shepherd, 2003). A company must offer customers greater value than its rivals in order to gain a competitive edge, and the ability to do so depends on its intellectual resources, capabilities, and competencies, which are the outcome of extensive experience in the use of a particular resource portfolio. Since these resources contain qualities that are barely attainable and whose link to results is difficult to ascertain, they are more protected from imitation by knowledge barriers than by intellectual property rights (Miller & Shamsie, 1996). Technical, creative, coordinative, and collaborative skills are the main manifestations of the knowledge-based paradigm. These competencies are mostly acquired by individuals, which are afterwards transferred, shared, and codified at the levels of organisational groups, organisational units, and the organisation as a whole. The usage of knowledge-based resources generates value that can be expressed as such, and because the study's intellectual capital component deals with both human-related and non-human-related knowledge, it was informed by the knowledge-based perspective. The stakeholder's view theory, which supports assessments of future business performance and value by the net value added created, served as the basis for this study's financial performance and enterprise value sections. Together, these two theories served as the study's direction.

III. METHODOLOGY

The study used an ex-post factor research design and data from publicly available annual financial reports and accounts of listed technological companies in Nigeria to examine the relationship between intellectual capital, financial performance, and enterprise value of listed technological companies in Nigeria. All technical enterprises that were listed on the Nigeria Stock Exchange as of December 2020 made up the study's population. There are nine (9) listed technological companies; Chams Plc, Computer Warehouse Group (CGW), Courteville Business Solutions (Courtville), e-transact International (Etranzact), NCR (Nigeria), Omatek Plc, Secured Electronic Technology, Thomas Wyatt Nigeria and Triple Gee & Company Plc. Seven companies were chosen as the sample size for the study using a straightforward random sampling procedure. The Computer Warehouse Group (CGW) and Thomas Wyatt Nigeria were excluded. In order to obtain information about the independent variables of intellectual capital (IC), financial performance (FP), and enterprise value (EV), as well as the dependent variable of EV, the study used secondary data that was gathered from audited annual reports and accounts of the listed technological companies in Nigeria.

EV was measured as = Market Value of common stock + Market value of preferred equity + Market Value of debt + Minority interest – Cash and Investments (Kennon, 2018).

The model used to measure IC in line with Suhenda (2015), Bita and Nasab (2016), Ofurum & Aliyu, (2018), Bala, Raja & Dandago (2019).

VAIC = Value Added Intellectual Capital Coefficient. It has the following components:
VAIC = HCE + SCE + CEE
Where:
HCE = Human Capital Efficiency
SCE = Structural Capital Efficiency
CEE = Capital Employed Efficiency

Return on Assets (ROA) was measured as Profit After Interest Tax to Total Asset in line with this was used by Suhenda (2015), Nuryaman (2015) and Return on Investment (ROI) measured as Total Returns on Investment to Total Asset in

accordance with Ofurun and Aliyu (2018) were employed to proxy financial performance. Physical capital intensity, calculated as Net Book Value of Fixed Assets ÷ Total Assets, is one of the study's control variables. Financial leverage, which was employed in the study by Kehelwalatenna and Premaratne (2012), was calculated as Total Debt/Book Value of Total Assets. This was applied in Ahanger (2011), Kehelwalatenna and Premaratne (2012), and Kamath (2015). The firm size was calculated using the natural logarithm of total assets.Descriptive statistics, correlation, and multivariate regression are among the methods used to analyse the data gathered for the study. The analysis was done using STATA version 13. The model specification for the study is shown below:

EV=F(IC, FP) ……. (i)

$$EV_{it} = \alpha + \beta_1 VAIC_{1it} + \beta_2 ROA_{it} + \beta_3 ROI_{it} + \beta_4 FS_{it} + \beta_5 LEV_{it} + \beta_6 PCI_{it} + \varepsilon_{it} \ldots\ldots \text{(ii)}$$

Where

EVit= Enterprise Value of company i at time t

VAICit= represents Value Added Intellectual Capital of firm i at time t

ROAit= represents Return on Assets of firm i at time t

ROIit =represents Return on Investment of firm i at time t

FSit=represents size of firm i at time t

LEVit= represents leverage of firm i at time t

PCIit =represents physical capital intensity of firm i at time t

i= denotes a specific firm and (is the financial year

α= is the intercept

β1 – β6 represents the coefficients of explanatory variables

$\varepsilon_{it}$is the random error term

IV. RESULT AND DISCUSSION

The outcomes of the data generated from the annual reports and accounts of the sampled companies are analysed and explained in this part.

A) Descriptive Statistics

The summary of the descriptive statistics for the dependent and explanatory variables is presented in Table 1. The mean, the standard deviation, the lowest and maximum values for the dependent and explanatory variables, as well as other measures of central tendency, are included in the descriptive statistics.

Table 1: Descriptive Statistics of Variables

Variables	Obs	Mean	Std dev.	Min	Max
EV	63	2.59	5.06	-1.16	1.47
VAIC	63	34.59	69.834	-130.71	326.29
ROA	63	-0.004	0.103	-0.394	0.232
ROI	63	2.65	9.431	0.020	62.611
FS	63	7.79	1.290	6.153	9.828
LEV	63	0.04	0.105	0	0.491
PCI	63	0.55	0.299	0.811	0.997

Source: Annual Report and Accounts of the sampled firms

It is clear from Table 1 that there are 63 observations for each variable. This is consistent with the fact that there were 7 selected companies and a 9-year study period. The mean Enterprise Value (EV) for the sampled companies is 2.59, according to the descriptive statistics of the dependent and explanatory variables of the study, which indicates a high degree of value among the sampled companies throughout the study period. The sampled organisations' EVs range in size, with the lowest and greatest values being -6.7 and 1.47, respectively, according to the standard deviation of 5.06, which shows that there is some variation.

The mean of 34.59 indicates that the majority of the sampled organisations have strong value-added intellectual capital (VAIC), which includes human capital, structural capital, and capital employed (capital employed) during the study period. 69.83 is the standard deviation. The minimum is -130.17 which implies that some companies in the technological sectors have a negative Value Added Intellectual Capital (VAIC) among which include Omatek Plc, NRC, Courtville Plc, and Chams Plc. The maximum of 326.29, suggests that there is a high level of Value Added Intellectual Capital (VAIC) in some technological companies during the study period.

The average Return on Assets (ROA) for companies in Nigeria's technology sector is -0.004, which suggests that 0.4% of the selected companies' total assets were lost by these businesses throughout the study period. The standard deviation shows

that there is a 0.103 standard deviation from the mean value. The minimum of -0.394 suggests that some of the firms suffered or recorded huge losses during the study period.

Return on Investment (ROI) in Table 1 also shows a mean value of 2.65, indicating that Nigerian technical enterprises' average ROI is almost 270%. The minimum of 0.02 suggests the least return on investment realized by some companies during the study period, while the maximum of 62.61 indicates that some of the sampled companies made or recorded a significant amount as return on investment. The standard deviation is 9.43.

Similar to the previous example, the mean of 7.79 for Firm Size (FS) indicates that the average firm size, which is calculated as a log of total assets, has a mean score of 7.79, while the maximum value of 9.828 and the minimum value of 6.153, and the standard deviation of 1.290, respectively, indicate that there is diversity among the sampled organisations. According to the Financial Leverage (LEV) figures, the tested companies' average long-term liabilities are merely 0.04, or 4%, of their total assets. A total maximum score of 0.491, or roughly 50%, is displayed by leverage. This suggests that debt was employed as a source of capital by half of the sample enterprises, and the minimum is 0.00. The sampled companies' modest variations from the standard of 0.105 are indicated by the deviation. PCI: Physical Capital Intensity To account for the effect of fixed assets on financial performance, a ratio of a company's fixed assets to its total assets (Firer and Stainbank, (2003), Firer and Williams, (2003) as quoted by Ahanger, (2010) is used to assess physical capital intensity. The outcome has an average of 0.55, a standard deviation of 0.299, and ranges between 0.811 and 0.997. The financial performance of a corporation is thought to be significantly influenced by its fixed assets.

B) Correlation Matrix of the Dependent and Explanatory Variables

Table 2 shows the association between the dependent and independent variables. The correlation matrix table displays the relationships between each pair of variables in the regression model, as well as the relationships between each independent variable and each explanatory variable separately. This sheds light on the relative sizes of the independent variable pairs.

Table 2: Spearman Correlation Matrix of the Dependent and Explanatory Variables

	EV	VAIC	ROA	ROI	FS	LEV	PCI
EV	1.0000						
VAIC	0.0742	1.0000					
ROA	-0.1969	-0.2691	1.0000				
ROI	-0.0753	0.5431	-0.0181	1.0000			
FS	0.3118	-0.2187	0.0601	-0.6430	1.0000		
LEV	0.1751	0.0613	-0.0207	-0.3422	0.4341	1.0000	
PCI	0.3996	0.2894	-0.3580	-0.1451	0.2092	0.1400	1.0000

Source: Descriptive Statistic Results Using STATA 13.0

The correlation coefficients between the independent variables Value Added Intellectual Coefficient (VAIC), Return on Asset (ROA), Return on Investment (ROI), Firm Size (FS), Financial Leverage (LEV), and Physical Capital Intensity (PCI) and the dependent variable Enterprise Value (EV) are shown in Table 2. According to Table 2, the correlation coefficient between VAIC and EV is 0.07421, indicating a positive link between the two variables. The sampled companies' realized Return on Asset (ROA) and EV have a negative link, as shown by the correlation coefficient of -0.1969. The correlation coefficient of -0.0753 between ROI and EV for sampled technological companies suggests that ROI and EV are negatively related.

C) Presentation and Interpretation of Regression Results

The regression analysis of the relationship between enterprise value (EV) and intellectual capital (IC) is presented in this subsection. Similar to this, the model also addressed the relationship between financial performance (FP) and enterprise value of the listed technical businesses in Nigeria. In Table 3, the coefficients are displayed.

Table 3: PCSEs Regression Result for IC, FP and EV

Variables	Coefficient	z-Stat	Prob
Constant	-1.2500	-6.72***	0.000
VAIC	-1886701	-2.94***	0.003
ROA	-3.9400	-1.07	0.286
ROI	2.1700	2.92***	0.003
FS	1.5700	6.12***	0.000
LEV	-9.0700	-2.16**	0.031
PCI	5.6000	3.43***	0.001
Hausman		0.0000	

Xttest3		0.0000	
R-Square		0.57	
F-Statistics		87.27	
Prob>F		0.0000	

Note: *,**,*** = Significant @ 10%, 5% and 1% respectively

Table 3 shows the PCSEs regression results for the sampled technical enterprises across the study period for the association between IC, FP, and EV. Additionally significant was the outcome of the Hausman Specification Test (P< 001) used to distinguish between the GLS random effect and fixed effect. The outcome suggests that the fixed effect was superior, but the heteroscedasticity result (0.0000) suggests that the error term's coefficient is not constant across all explanatory variables. To correct this, Panel Corrected Standard Error Regression (PCSEs) was conducted, presented, and subsequently interpreted.

F-statistics have a value of 87.27 and a P-value of 0.0000. Given that the number is less than 1%, this shows that the model is appropriate and the variables are effectively combined for the study. The VAIC, ROA, ROI, FS, LEV, and PCI changes, along with the changes in VAIC, ROA, ROI, and LEV, together account for 57% of the variance in the dependent variable (EV) of listed technology businesses in Nigeria, according to the R-square coefficient (R2) of 0.57. This suggests that other variables not included in the study's model are responsible for 43% of the variations in EV of the sampled enterprises.

At a 1% level of significance, the regression result for VAIC under Z-Statistics (-2 94) shows that it has a detrimental and significant impact on the EV of listed technical enterprises. The meaning of this is that Enterprise Value (EV) is decreased by the amount of investment in Value Added Intellectual Capital (VAIC), which includes human capital, structural capital, and capital employed efficiency. This finding is in line with (Mohsen, Mahmoud, Nasim & Forough, 2014). The Z-Statistics regression result of (-1.07) with a coefficient of (-3.94) in respect of ROA and EV indicates that return on the asset has a negative and insignificant impact on enterprise value While ROI has a positive and significant impact on EV at 1% level of significance, this is indicated by the result of the Z-statistics of (2.92) and coefficient of (2.71). The implication of this result is that the ROA impact negatively on EV while ROI impact positively, furthermore, ROA impact insignificantly while ROI impact significantly.

With a positive value of 1.57 and a Z-Statistics of 6.12, the firm size (FS) coefficient indicates that, at a 1% level, FS has a positive and significant impact on EV. This suggests that the size of businesses, as measured by the log of the total assets of listed technological companies in Nigeria, has a favourable and significant impact on the value of the enterprise, attesting that an increase in size by one additional unit, while other independent variables remain constant, increases the enterprise value. However, the financial leverage (LEV) regression result coefficient and Z-statistics of (-9.07) and (-2.16), respectively, reveal that (LEV) has a considerable negative influence on EV at a 5% level. This indicates that, with all other independent variables being constant, an increase in leverage of one additional unit results in a reduction in enterprise value of (-9.07). The positive coefficient of (5.60) and Z-statistics of (3.43), which indicate that an increase in PCI by one more unit increases EV by (5.60), while other independent variables remain constant, are further evidence that the relationship between PCI and EV is positively significant.

V. CONCLUSION AND RECOMMENDATION

The study's findings indicate that Intellectual Capital, Leverage, Firm Size, and Physical Capital Intensity all have a positive and significant impact on the enterprise value of the Nigerian technological companies that were sampled. Return on Asset, however, has a negative and insignificant impact on enterprise value. The study, therefore, recommended that firms in the Nigerian technological sector should expose employees to industrial-based seminars, workshops, and training and also employ more equity instead of debt to finance growth and expansion. Similarly, Nigerian technological firms should utilize their assets fully in the course of their operations and dispose of idle assets while proceeds from such disposal should be utilized to finance other profitable investments with a view to enhancing the firms' value. The companies should also pay more attention in channeling their resources towards investment that will enhance physical capital intensity and increase the firm size as these would lead to improvement in enterprise value.

VI. REFERENCE

[1] Ahangar, R. O. (2011). The Relationship between Intellectual Capital and Financial Performance: An Empirical Investigation in an Iranian Company. *African Journal of Business Management* 5(1), 88-95.

[2] Bala, A. J., Raja, A.S., & Dandago, K.I. (2019). The Mediating Effect of Intellectual Capital on Corporate Governance and Financial Performance of Conglomerate in Nigeria.*SEISENSE Journal of Management*, *2*(3), 16-29.

[3] Beshkooh, M., Maham, K., & Heidarzadeh, S. (2013). Effects of intellectual capital on financial performance with regard to life cycle and the company size. *Journal of Basic and Applied Scientific Research*, *3*(2), 209-217.

[4] Brooking, A. (1996). Intellectual capital: Core asset for the third millennium enterprise. London: International Thomson Business Press.

[5] Chang, L., & Birkett, B. (2004). Managing intellectual capital in a professional service firm: exploring the creativity–productivity paradox. *Management Accounting Research*, 15, 7–31.

[6] Chen, S. Y. (2009). Identifying and prioritizing critical intellectual capital for e-learning companies. *European Business Review*, *21*(5), 438-452.

[7] Chokri, Z., Asma, A., & Najla, B. (2012). How Intellectual Capital Affects A Firm's Performance? *Australian Journal of Business and Management Research. 2* (08) 24-31.

[8] Clarke, M., Seng, D. & Whiting, R. H. (2010). Intellectual Capital and Firm Performance in Australia, Paper accepted for presentation at the AFAANZ Conference, Christchurch, New Zealand, July 2010.

[9] Deep, R., &Narwal, K.P. (2014). Intellectual Capital and its Association with Financial Performance: A Study of Indian Textile Sector. *International Journal of Management and Business Research. 4* (1), 43-54.

[10] Edvinsson, L., & Malone, M.S. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower*. New York, NY, Harper Business.

[11] Emamgholipour, M., Pouraghajan, A., Tabari, N. A. Y., Haghparast, M., & Shirsavar, A. A. A. (2013). The effects of performance evaluation market ratios on the stock return: Evidence from the Tehran stock exchange. *International Research Journal of Applied and Basic Sciences, 4*(3), 696–703.

[12] Eskandar, J. (2013). Intellectual Capital and its Effects on Firms' market value and Financial Performance in Iran: An Investigating Pulic Model. *Research Journal of Recent Sciences ISSN 2277-2502 2*(3), 1-6.

[13] Feimianti, E., & Anantadjaya, S. (2014). Value Creation of Intellectual Capital: Financial Performance Analyses In Indonesian Publicly-Listed Consumer Goods Industry.*Review of Integrated Business and Economic Research. 3*(1), 99-113

[14] Hamehkhani, S., Boochani, K., & Rarani, M.T. (2014).Analyzing the effects of intellectual capital on market value and financial performance of companies in the steel industry.*Journal of Applied Environmental and Biological Sciences , 4*(1), 60-68.

[15] Huang, T., C. (2012). The effects of HPWS and intellectual capital on firm performance. Retrieved from:http://ssrn.com/abstract=2129629 22/06/2019 22:34

[16] Ihyaul U., Indra M., N. & Adi P.(2020). Intellectual Capital Performance, Enterprise Risk Management, Financial Performance and Firm Value of Islamic Companies in Indonesia. *International Journal of Advanced Science and Technology*. *29* (4) 15-27.

[17] Irina B., & Elvira Z., (2013).Intellectual capital and company value. Contemporary Issues in Business, Management and Education 2013.*Procedia - Social and Behavioral Sciences 110,* 887 – 896.

[18] Jian X, & Feng L. (2020) The Impact Of Intellectual Capital On Firm Performance: A Modified And Extended Vaic Model. *Journal of Competitiveness*, *12*(1), 161–176.

[19] Kamath, B. G. (2015), Impact of intellectual capital on financial performance and market valuation of firms in India, *International Letters of Social and Humanistic Sciences*, 48. 107-122.

[20] Kavida, V. & Sivakoumar, N. (2008). Corporate governance in knowledge economy The relevance of intellectual capital. Retrieved from: http:// www.ssrn.com/id1152892 23/08/2020 10:15

[21] Kehelwalatenna, S. &Premaratne, G. (2012). An empirical investigation on intellectual capital performance Evidence from banking sector. Retrieved from: http://ssrn.com/abstract=2152813 16/09/2018 1:43

[22] Kennon, J. (2018). What is the Enterprise value of a Company: How to calculate the Enterprise Value of a Company. Retrieved from: thebalance.com

[23] Khanqah, T., V., Akbari, K., K.,& Ghanavati, E. (2012). An Empirical Investigation of the Impact of Intellectual Capital on Firms' Market Value and Financial Performance: Evidence from Iranian Companies. *International Journal Management Business Research 2* (1), 1- 12.

[24] Kim, T. ,Yoo, J. J. E., & Lee, G. (2010). The HOINCAP scale: measuring intellectual capital in the hotel industry. *The Service Industries Journal*, First published on: 28 September 2010 (iFirst).

[25] Mariya, M., Olga, A., & Jana, N. (2012). Intellectual capital impact on financial performance: Industry effects. Retrieved from:http://www.ssrn.com/abstract =2001472 9/12/2018 8:18

[26] Martin, W. J. (2000). Approaches to the measurement of the impact of knowledge management programmes. *Journal of Information Science*, *26*(21), 21-27.

[27] Miller, D., & Shamsie, J. (1996). The Resource-Based View of the Firm in Two Environments the Hollywood Film Studios from 1936 to 1965. *Academy Management Journal39*(3), 519-543.

[28] Mohsen, I., Mahmoud, M., Nasim, S., & Forough, H. (2014). The Effect of Intellectual Capital on Cost of Finance and Firm Value. *International journal of academic research in Accounting, Finance and Management Sciences. 4*(2), 1-8.

[29] Mouritsen, J. (1998). Driving growth: Economic Value Added versus Intellectual Capital. *Management Accounting Research*, *9*(4), 461-482

[30] Nimtrakoon, S. (2015).The relationship between intellectual capital, firms' market value and financial performance Empirical evidence from the ASEAN. *Journal of Intellectual Capital*, *16*(3), 587-618. https://doi.org/10.1108/JIC-09-2014-0104.

[31] Nwaiwu, J.N., &Aliyu, A., S. (2018). Intellectual Capital Reporting And Measures Of Financial Performance Of Companies In Nigeria. *International Journal of Advanced Academic Research | Financial Management | ISSN: 2488-9849. 4*(2).

[32] Nuryaman (2015). The Influence of Intellectual Capital on The Firm's Value with The Financial Performance as Intervening Variable. *2nd Global Conference on Business and Social Science-2015, GCBSS-2015*, 17-18 September 2015, Bali, Indonesia.

[33] Ofurum, C., O. &Aliyu, A., S. (2018) Intellectual Capital Component And Financial Performance Of Quoted Banks In Nigeria. *International Journal of Advanced Academic Research Financial Management | ISSN: 2488-9849 4*(2) (February 2018).

[34] Özer, G., & Çam, I., (2017) The Moderating Effect Of Human Capital On Innovation Capital and Firm Market Value Relationship: An Application On Bist. *Int. Journal of Management Economics and Business, ICMEB17 Special Issue*

[35] Pulic, A. (2000). VAIC- An accounting tool for IC management. *International Journal of Technology Management*, *20*(5-8), 702-714.

[36] Poraghajan & Abbasaly (2013). Impact of Intellectual Capital on Market Value and Firms' Financial Performance: Evidences from Teheran Stock Exchange. *World of Sciences Journal year 2013, 1* (12), 197-208.

[37] Ramezan, M. (2011). Intellectual capital and organizational organic structure in knowledge society: How are these concepts related? International *Journal of Information Management*, 31, 88–95.

[38] Ramı´rez, Yolanda (2010). Intellectual Capital Models in Spanish Public Sector.*Journal of Intellectual Capital.11*(2).

[39] Sardo, F., & Serrasqueiro, Z. (2017). Intellectual Capital and Firms" Financial Performance: A European Empirical Study. *Business and Economic Research ISSN 2162-4860 2017, 7.* (2).

[40] Shafi'u, A., K., Noraza, M., U., &Saleh, M., B. (2017). The impact of intellectual capital on the financial performance of listed Nigerian food products companies.*Journal of Accounting and Taxation. 9*(11), 147-160.

[41] Stewart, T., A. (1997). *Intellectual capital, The wealth of organizations.* New York Doubleday/Currency.

[42] Suhenda, E., S. (2015) The Influence of Intellectual Capital on Firm Value towards manufacturing performance in Indonesia. *International Conference On Eurasian Economies* 2015. 54-61
[43] Sullivan, P.,H. (2000) Profiting From Intellectual Capital Learning From Leading Companies.*Journal of Intellectual Capital.1*(1), 33-46.
[44] Sveiby, K., E. (1997). *The new organizational wealth: Managing and Measuring Knowledge Based Assets.* Berrett-Koehler, New York, NY.
[45] Wiklund, J., & Shepherd, D. (2003).Knowledge-based Resources, Entrepreneurial Orientation, and the Performance of Small and Medium-sized Businesses. *Strategic Management Journal* 24, 1307-1314
[46] Yang, C. C., & Lin, C. Y. Y. (2009). Does intellectual capital mediate the relationship between HRM and organizational performance? Perspective of a healthcare industry in Taiwan. *The International Journal of Human Resource Management, 20*(9), 1965-1984.
[47] Yegane, Y. H., Moazez, E., Nikoonesbati, M., & Khanhossini, D. (2013). An auditing impact of components of IC on the financial performance of pharmaceuticalcompanies accepted in Tehran stock exchange. Retrieved from:http://ssrn.com/abstract=2215746 30/2/2019 6:18
[48] Yilmaz, I., & Acar, G. (2018). The Effects of Intellectual Capital on Financial Performance and Market Value: Evidence from Turkey. *Eurasian Journal of Business and Economics 2018, 11*(21), 117-133.