

## INTELLECTUAL CAPITAL EFFICIENCY AND MARKET VALUE

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### ABSTRACT

*The research investigated the effect of Intellectual Capital Efficiency (ICE) on Market Value of consumer goods companies in Nigeria. Secondary data were obtained from published financial reports and accounts of active consumer goods companies listed on the Nigerian Stock Exchange for ten years (2010 – 2019). Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Employee Size (ES) were selected as independent variables which are also the variables of interest while Market Value proxied as Tobin Q (TQ) was selected as the dependent variable. Null hypotheses were formulated for the study and secondary data obtained from the financial statements of the companies. The data were analysed using descriptive analysis, correlation matrix, and regression analysis. The Random Effects Generalized Least Square (GLS) regression result showed that Capital Employed Efficiency (CEE) has a significant positive effect at 1% level of significance on company market value. While Human Capital Efficiency (HCE) and Structural Capital Efficiency (SCE) revealed an insignificant negative effect on Market Value. Employee Size (ES) had a positive but insignificant effect on Market Value. This research recommends that Capital Employed Efficiency (CEE) should be encouraged through financial capital investments on tangible assets like computer hard wares and software, artificial intelligence, employing the use of machine learning and smart assistance which promotes market value.*

### 1. Introduction

Economic development and affluence in contemporary times are majorly influenced by intangible (intellectual) assets. Financial assets and tangible assets are generally regarded as commodities, while temporary monopolies, abnormal profits, and leading competitive positions are often times attained through effective use of intangibles, combined with other types of assets (Lev, 2001).

There is a transition from the conventional ‘Product Based Organization’ to ‘knowledge-intensive organization’ in this 21<sup>st</sup> century. Hitherto companies running the product-based organization determine their ‘Capital’ as cash, assets, the net worth of the company, or other valuables. These days ‘Intangibles’ or ‘Intellectual Capital’ are determined as the capital for knowledge-intensive organizations (Hendricks, 1976).

In digital age parlance, business models are described as being in a situation whereby more value is created by intangible resources when compared to tangible resources (Janosevic, 2009).

This study is concerned with the effect of Intellectual Capital Efficiency (ICE) on market value in consumer goods companies in Nigeria.

## Statement of the Problem

Investigative tests have generally been made seeking the association or cause and effect relationship between Intellectual Capital and Firm Market value and/or firm performance as evidenced in the works of Alabass (2019), Ahangar (2011), Deep & Narwal (2014). Some have sought intangible management, measurement and reporting as it affects the physical and business performance, Lev (2001), while Zeghal and Maaloul (2010) worked on the examination of value-added as a test of Intellectual Capital and its significances on company performance. Several studies have been done on various companies categorized in the industries of their specializations such as in textile industry; Deep and Narwal (2014), software technology; Dooley (2000), pharmaceuticals; Ghosh and Mondal (2009), banking; Adebayo (2017) and Kamath (2008), financial; Joshi, Cahill and Kansal (2013), multinational; Riahi - Belkaoui (2003), the oil and gas companies inclusive, Gurowa and Abdulwalah (2018) and Kharal, Rehman, Abram, Khan and Kharal (2014). For this work, the industry covered is consumer goods companies quoted on the Nigerian Stock Exchange.

In the same vein, several studies have been done globally such as in Nigeria by Gurowa and Abdulwalah (2018) also Adebayo (2017). In India, Akter and Parvine (2012), Al Mamun (2009), Deep and Narwal (2014), Ghosh and Mondal (2009) and also Kamath (2007). While in Malaysia the works of Bontis, Dragonetti, Jacobsen and Roos (1999) exist. Cabrita and Vaz (2006) did their investigation using Portuguese companies, while Kharal, Rehman, Abram, Khan and Kharal (2014) tested Pakistani companies. Finland companies were investigated by Kujansivo and Lonnqvist (2007). Austria produced works by Pulic and Bornemann (1997), the United Kingdom, Brooking (1996), Hong Kong, Chan 2009, Taiwan, Tseng and Goo (2005), Iran, Ahangar (2011), Iraq, Alabass (2019). In Indonesia, Ari Barkah, Dominique and Caroline 2013. while American companies, recorded works from Becker-Blease, Kaen, Etebari and Baumann (2010), also Belkaoui (2002) and Riahi- Belkaoui (2003). This work is, however, investigating consumer goods companies in Nigeria for 10 years (2010-2019)

As the works are varied so are the choices for proxies for market value. Ari Barkah, Dominique and Caroline (2013) used stock return in measuring entity value. Price-to-book Value was used by Bassi and Van Buren (1999), so also did Firer and Williams (2003). Equity Market Value was used by Chan, Lakonishok and Sougiannis (2001). Market to Book Value is another parameter which was used by Deep and Narwal (2014) and also Gan and Saleh (2008). Meanwhile, Tobin-Q was used to measure market value by Tseng and James Goo (2005) and so did Pulic and Bornemann (1997). This work shall be using Tobin Q to measure market value.

Interestingly proxies for Intellectual Capital included Brand, Competence, Corporate culture, Customer base, Information technology, Intellectual property, partnership, personnel, proprietary process, Research and Development as reported by Abdolmohamadi (2005). Others used proxies such as Relational Capital, Capital Employed Efficiencies, Structural Capital, Human Capital and Value-Added Intellectual Capital (VAIC). For instance, Structural Capital was used by Cabrita and Vaz (2006) in measuring Intellectual Capital. They also used Relational Capital and Human Capital as well in measuring Intellectual Capital. While Alabass (2019) used Value-Added Intellectual Capital (VAIC), Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE) and also Structural Capital Efficiency (SCE) as proxies for Intellectual Capital. He went further to use Leverage, Firm Size and Time as control variables. This work is introducing employee size as an independent variable to test its effect on the market value of consumer goods companies in Nigeria in the period between 2010 to 2019.

In these works, diverse methodologies were used, though mainly correlation Analysis and Multiple regression analysis were used as seen in the works of Ahangar (2011), Alabass (2019), Ting and Lean (2009) etc. Other methodologies used included Partial Least Square (PLS) regression analysis, Tan, Plowman and Hancock (2007); OLS (Ordinary Least Square) and Pearson Product moment correlation coefficient, Ofurum and Adeola (2008); VAIC methodology and regression model, Nuryaman (2015). This work would hinge its investigation on multiple regression analysis since it is seeking to determine a cause-and-effect relationship of intellectual capital on market value.

Empirical results of intellectual capital and market value are varying even when intellectual capital is supposed to be viewed as an asset of the company and as such predicted that increase in intellectual capital should naturally increase the value of the company simultaneously. Though, some studies found a positive correlation between intellectual capital and company value, such as the works of Abdolmohamadi (2005), Ahangar (2011), Alabass (2019), Bassi and Van Buren (1999) to mention a few while others did not find any relationship, such as the works of Chan (2009), Deep and Narwal (2014) and Firer and Williams (2003). Meanwhile, these empirical results were only particular to the specific companies in particular industries, within specified scope and periods thereby limiting their findings. This is as demonstrated in the study done by Ahangar (2011) whose empirical analysis was done on Iranian companies, Alabass (2019) worked on the Iraq stock exchange quoted companies, Chan (2009) on companies quoted on the Hang Seng Index, Hong kong while Deep and Narwal (2014) worked on textile companies in India. These empirical analyses evidently show they were carried out at different periods and had varying scopes. So, the generalization of their findings may not be totally relied on. Nuryaman's (2015) work discovered that intellectual capital has a positive effect on firm value; this was supported by Tseng and James Goo (2005) whose results were obtained from their work carried out in Taiwan on manufacturing firms. Testing Italian companies, Veltri and Sylvestri (2011) also posited that the results from their studies concluded that a significant positive relationship between Intellectual Capital and the market value of firms. Though after an investigation by analysing intellectual capital using value-added as its proxy and obtaining its significances on three hundred United Kingdom companies' performances, results revealed that the Companies' IC had a positive impact on economic and financial performances. Association between IC and stock market performance were recorded only by high-tech industries as being significant. Furthermore, the results also indicated that capital employed remains a key element of financial and stock market performances even though it has a negative effect on economic performance. The three hundred UK companies were categorised into three groups of industries: high-tech, traditional and services. Undoubtedly, the subject of intellectual capital and its impact on value is contemporary and more research is necessary, that is why this work has sought to fill proxy gaps by specifically using Tobin's Q to measure Market value, while Human Capital Efficiency, Structural Capital Efficiency, Capital Employed Efficiency and Employee size are measures of Intellectual capital but to be controlled by Firm Age and Leverage. A sector and the period gap would also be filled since this work shall cover the consumer goods sector companies listed on the Nigeria stock exchange for ten years (2010-2019).

### **Objectives of The Study**

The main objective of this study is to investigate the effect of Intellectual Capital Efficiency on the market value of consumer goods companies in Nigeria. This was pursued through these specific objectives to

- i. Determine the effect of Human Capital Efficiency on market value.
- ii. Examine the effect of Structural Capital Efficiency on market value.
- iii. Test the extent to which Capital Employed Efficiency affect market value.
- iv. Investigate the effect of Employee size on market value.

### **Research Questions**

The under listed research questions directed the study.

- i. How does Human Capital Efficiency affect market value?
- ii. What effect does Structural Capital Efficiency have on market value?
- iii. To what extent does Capital Employed efficiency affect market value?
- iv. How does Employee size affect market value?

### **Research Hypotheses**

As a result of the research questions above the following null hypotheses were formulated;

**H<sub>01</sub>:** Human Capital Efficiency has no significant effect on market value of consumer goods companies in Nigeria.

**H<sub>02</sub>:** Structural Capital Efficiency has no significant effect on market value of consumer goods companies in Nigeria.

**H<sub>03</sub>:** Capital Employed Efficiency has no significant effect on market value of consumer goods companies in Nigeria.

**H<sub>04</sub>:** Employee size has no significant effect on market value of consumer goods companies in Nigeria.

### **Scope of The Study**

The study focuses on the consumer goods sector in Nigeria. The study covers the period of ten years, spanning from 2010 to 2019.

## **2. Review of Related Literature and Hypotheses Development**

### **Conceptual Framework**

#### ***Market Value***

Market value, as defined by The Royal Institution of Chartered Surveyors (2003), in their Appraisal and Valuation Standards is the estimated amount for which a property should exchange between a ready buyer and a ready seller on that day of estimation. Whereby the property went through proper advertisement and publicity and both buyer and seller acted knowledgeably, prudently, voluntarily and independently.

In all, there are many different definitions of market value, depending on the organisation's finding it necessary to write a definition. Most definitions include the following: the price that

would be paid by an interested buyer to an interested seller after a property's exposure to a marketplace of equally capable buyers, each fully knowledgeable about the property and the market place and neither operating under any sort of external influences.

Market value is conceptualized as the price that could be obtained by selling an asset on a competitive open market. Market Value is often seen to be entirely dependent on the financial market. Market value and market capitalization are terms used interchangeably and have been defined by the financial markets to be the quantified value of a company. This is achieved by multiplying the number of outstanding shares traded on the stock market with the current stock market price.

Schmidt (2020) conceptualized Market Value simply as the price at which something is currently being sold in the market, or the price a company could obtain an asset it owns.

While the market value reflects what a business is worth according to market participants, book value is a reflection of what a business is worth according to its financials (i.e. its financial statements).

The concept of Market value for this work is the price at which a security could presumably be purchased or sold at the Nigerian Stock Exchange which is a regulated market. The aggregate of the price of all shares being market capitalisation is what investors believe a firm is worth this is obtained by multiplying the number of shares outstanding by the current market price of a firm's shares.

Tobin's Q model is a very popular model, developed by Tobin (1969) and this would be used to determine market value in this work.

$$\text{Tobin's Q} = \frac{\text{Equity Market Value}}{\text{Equity Book Value}}$$

However, for this work, Tobin's Q would be used as a proxy to establish the relationship between the market value of consumer goods in Nigeria. This is because Tobin's Q is used as a measurement of performance, also because it is simple and adaptable. For this work TQ shall be calculated as;

$$\text{TQ} = \frac{(\text{Market Capitalization} + \text{Total Liabilities}) - \text{Cash flow}}{\text{Total asset}}$$

### ***Intellectual Capital Efficiency***

Lu, Wang, Tung, and lin (2010) conceptualized Intellectual capital as whatever any business entity can use to enhance its competitive advantage in the marketplace, which may include knowledge, intellectual property rights, information, and experience. So, therefore, IC is described as intangible assets that add value to financial statements bottom line, but it cannot be expressed as a line item in financial statements. Intellectual capital has been conceptualized to be the group of knowledge assets that are attributed to the value creation of an organization (Chu, Lin, Hsiung, and Liu, 2006); a set of critical resources used to facilitate productivity and generate income (Peng, Pike, & Roos, 2007). While Martin (2000) described IC as the knowledge that has been structured to produce a higher-valued asset. Burr and Girardi, 2002

argued that Intellectual capital is the capability of workers, information availability, and work experience, and the opportunity provided by the work system to activate stocks of intellectual capital. They further postulated that it is also a future earning potential from a combination of human capital brains, skills, insights, and the potential of an organization's people. Rudez and Mihalic (2007) perceived Intellectual capital as an item that is neither physically visible nor has financial attributes but yet significantly influences future benefits. Just as Beattie and Thomson (2007) claimed that to create company value and it is intangible. In their work, Kim and Kumar (2010) theorized that Intellectual capital is the resource that has been transformed to create greater value assets. Han and Han (2004) explained that the gap between the market value and book value of an organization at a time of decreasing the usefulness of current financial reporting is a measure of an organization's core competencies and competitive advantage which is attributed to IC. Andriessen (2004) believes that the cumulative knowledge of members of an enterprise and the applied translation of this knowledge into brands, trademarks, and processes is IC. Simply put he said that IC is profit obtained through the conversion of knowledge.

Bozbura and Beskese (2007) ascribed Intellectual capital as assets relating to employee knowledge and expertise, customers' loyalty to the company and its products, brands, patents, franchises, trademarks, administrative procedures, information systems, and company business process efficiency. Bukh, Larsen, and Mouritsen (2001) in their work viewed Intellectual capital as the integration of organizational capital, human capital and customer capital.

For this work, Intellectual Capital Efficiency (ICE) is conceptualised as knowledge, data, processes, procedures, and financial capital employed in firm activities that create value.

### ***Capital Efficiency (HCE)***

Value-Added Intellectual Capital (VAIC) encompasses Human Capital Efficiency (HCE) as one of its elements and this measures the value added by the human resources of an organization (Kwarbai & Akinpelu, 2016). VAIC Methodology has been discussed extensively; such as the works of (Chan,2009; Chen, Cheng & Hwang, 2005; Firer & Williams, 2003; Goh, 2005; Mavridis, 2004; Tseng & Goo, 2005; William, 2000). The availability of these studies adds further credibility to the usage of this methodology. According to these researchers,

For this work, Human Capital Efficiency (HCE) in numbers is computed as Revenue minus cost of revenue divided by Staff Cost.

$$HCE = \frac{\text{Revenue} - \text{cost of revenue}}{\text{Staff Cost}}$$

HCE is conceptualised in this work as the value added by way of Gross profit in a firm per staff cost.

***Structural Capital Efficiency (SCE)***

Structural capital is viewed as being less obvious (as per tangibility) but can be described as being more technical than the other aspects of Intellectual Capital (Moon & Kym, 2006). Structural capital (SC) is the availability of information systems, knowledge applications, databases, processes and other infrastructure required to support the firm in executing its strategy (Bontis, Chua & Richardson, 2000). Structural capital is the underlying knowledge that drives the knowledge stored in databases, procedures, publications, and organizational culture, which involves value creation in organizations (Kong, 2008). Alternatively, structural capital can be described as the knowledge embedded in an organization's processes, routines, and practices. Structural capital includes non-human storehouses of knowledge in an organization that supports its human capital (Watson & Stanworth, 2006).

Effective structural capital is built through organizational processes, information systems, organizational culture, internal organizational structure, or administrative systems (Tseng & Goo, 2005). Structural capital not only creates systems for knowledge acquisition but also provides a mechanism for collecting and integrating the acquired knowledge (Grant, 1996b).

For this work, Structural Capital Efficiency (SCE) in numbers is computed as Revenue minus cost of revenue and staff cost divided by Revenue Minus Cost of Revenue.

$$SCE = \frac{\text{Revenue} - (\text{cost of Revenue} + \text{staff cost})}{\text{Revenue} - \text{Cost of Revenue}}$$

Structural Capital Efficiency (SCE) is conceptualized in this work as firm value-adding components such as processes, procedures, organizational culture, databases, and other infrastructure that helps the firm realize its organizational goals.

In absolute terms, it is value created devoid of direct human intervention as depicted by staff costs.

***Capital Employed Efficiency (CEE)***

This is a ratio used in obtaining the total value added to the book value of assets and wages. Capital Employed (CE) is the Financial Capital while Capital Employed Efficiency (CEE) is obtained by the quotient of Value-added (VA) and Capital employed (CE).

$$\text{Capital Employed Efficiency (CEE)} = \text{Value Added (VA)}/\text{Capital Employed.}$$

For this work, Capital Employed Efficiency in numbers is computed as Revenue minus cost of revenue divided by total asset minus intangible asset.

$$\text{Capital Employed Efficiency (CEE)} = \frac{\text{Revenue} - \text{cost of revenue}}{\text{Total asset} - \text{intangible asset}}$$

For this work Capital Employed Efficiency (CEE) is conceptualised as the value added by financial capital which is often reflected in the value of tangible assets.

### *Concept of Employee Size (ES)*

The size of a firm can be measured in a number of ways: assets, sales, employees, and value-added are commonly used measures. According to Becker-Blease, Kaen, Etebari, and Baumann (2010), value-added or the number of employees rather than assets or sales

are better measures of firm size for organizational theories. Benefits of value-added means taking cognisance of the complexity of an organization. Which is associated with the request for an increase in highly skilled employees which may result in greater coordination and control costs. This variable (Employee Size) is simply measured as the number of employees engaged in an enterprise. An enterprise is defined as a legal entity possessing the right to conduct business on its own.

For this work Employee Size (ES) is conceptualised as the total number of employees engaged and working in the respective companies during the period under review.

### *Concept of Firm Listing Age (FAGE)*

Firm age is the number of years of incorporation of the company; even some school of thought believe that listing age, should define the age of the company (Shumway, 2001). According to him, listing age is more economical since the listing is a defining moment in the company's life. As a legal person, a company is born through incorporation (Gitzmann, 2008; Pickering, 2011). Hence for this work, the definition/concept of firm listing age is the length of time measured in years for which the company is listed on the relevant Stock Exchange.

### *Concept of Leverage (LEV)*

Leverage just means debt according to businessdictionary.com. It is the borrowing of funds in order to finance the purchase of equipment, inventory, and other company assets. Debt or equity can be used by entrepreneurs to finance or buy company assets. Borrowing increases, the company's risk of bankruptcy, but it can also increase the company's profits and returns particularly its return on equity. Leverage is therefore referred to as borrowing funds in order to expand or invest in a business venture for the purpose of creating greater value for the firm or investors.

This is measured as:

$$\text{LEV} = \text{Leverage} = \frac{\text{Total Debt}}{\text{Total Assets}}$$

While it is conceptualised as the debt owed by business entity per asset cost.

## **Theoretical Framework**

### *Resource-based View theory (RBV)*

This work is built on resource-based theory which was propounded by Wernerfelt in the year 1984. Pearce and Robinson (2011) defined the resource-based theory (RBT) as the examination

of an organisation's peculiar blend of intangibles, assets, capabilities and skills with a view to discovering its strategic advantages over others. This theory is concerned with the firms' unique core features and their effect on firm performance. It perceives the firm as a mixture of resources which create organisational proficiencies which the organisation utilises to earn reasonable profitability (Grant, 1991). Separately, firms develop competencies from these resources and when properly harnessed these competencies are the foundation of the firms' competitive advantages.

The resource-based theory is a diagnostic tool for identifying the strategic advantage of businesses by integrating capital heterogeneously. These resources include tangible assets, intangible assets, and the business' abilities. The resources used by the company to develop the company's competitive advantages are based on these principles:

- 1) quality customer service,
- 2) distinctive capital,
- 3) the recipient of the capital,
- 4) the obsolescence of the capital (Barney, 1991).

Invariably, RBV's fundamental canons are related to capital vis-à-vis resources that are valuable, rare, inimitable, and Non-substitutable, VRIN being the acronym (Barney, 1991). VRIN resources are known to encourage exploratory distinctive business progress and advancement (Alvarez & Busenitz, 2001) and hedge first-mover advantages, when opportunities have been utilized (Peteraf, 1993).

According to RBV model, firms who have abundant/significant VRIN resources will like have sustained competitive advantages and, as a result, impressive firm performance (Barney, 1991; Wernerfelt, 1984). Due to the value and rarity of resources firms to generate novel economic value, while inimitability and non-substitutability provide unique devices that lock in rents derived from these resources (Barney, 1993; Peteraf, 1993; Rumelt, 1984). Previous studies on RBV have significantly supported its predictive power on performance.

Firm growth is synonymous with value creation, but other performance indices such as profitability are recognized after the value has been distributed among different stakeholders (Crook, Ketchen, Combs & Todd, 2008). It can, therefore, be concluded that growth provides a very important performance outcome for the verification of the competitive advantage predictions of RBV. Diverse capital/resources are therefore the basis and extent of competitive advantage as postulated by Resource-based View.

In relation to this work, Intellectual Capital Efficiency (ICE) is the Valuable, Rare, Inimitable and Non-substitutability resources as explained in Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Employee Size (ES). These are basically Intellectual Capital Efficiency resources which demonstrate their unique nature. It is expected that the VRIN resources would enhance market Value and result in a competitive edge.

## Empirical Review

### *Nigeria*

In their work Gurowa and Abdulwahab (2018), Impact of financial performance on Human Capital Efficiency of seven (7) selected quoted oil and gas companies in Nigeria for a scope of five (5) years (2012- 2016) using multiple least square regression analysis revealed that both Market Price and Book Value per share are significantly influenced by the Human Capital Efficiency (HCE) of quoted oil and gas companies in Nigeria,

In their research, the effect of firm characteristics on the profitability of eighteen (18) listed consumer goods companies in Nigeria for a period of six (6) years, 2011 - 2016, Dioha, Mohammed, and Okpanachi (2018), observed that leverage, firm size and growth of sales have significant effects on profitability. On the contrary, firm age and liquidity are not significantly affecting the profitability of listed consumer goods companies in Nigeria. Return on sales (ROS) being the dependent variable was used to proxy profitability, while firm characteristics was the independent variable proxied by firm age, firm size, sales growth, liquidity and leverage. The population of the study consists of twenty-two (22) listed consumer goods companies as at 31st December 2016. The study employed multiple regressions as a tool for analysis.

Concurrently, Oyedokun and Saidu (2018) in their study of the impact of intellectual capital on the financial performance of fourteen listed Nigerian oil marketing companies for ten years (2007-2016), using the monetary model of Tobin's Q (MMQR), the market to book value (MB), and Value Added Intellectual Capital (VAIC) as proxies for IC, while financial performance was proxied by ROA, concluded that MB has a negative significant impact on Return on Assets (ROA), while both MMQR and VAIC have insignificant impacts on ROA.

Exploring Intellectual capital and performance of Nigerian banks, John-Akemelu and Iyidiobi (2018) had a result of a strong positive effect of HCE, SCE and CEE on Employee productivity (LogEP). But on growth in Nigerian banks results indicated a negative relationship was recorded between HCE, SCE and CEE and growth. This work had a sample of six selected banks, from 2010 through 2015 (six years). Dependent variables were Growth in revenue and Employee productivity (LogEP). While the independent variables were HCE, SCE and CEE.

Shafiu, Noraza and Saleh (2017) in their work the impact of intellectual capital on the financial performance of listed Nigerian food products companies for the period 2010-2014 (five years) discovered after regression analysis that Structural Capital and Capital Employed influence the financial performance of Nigerian food products companies. The dependent variable was ROA, while independent variables were VAIC, VASC, VACE, Size (firm size) and leverage. Here the VAIC model was employed.

Further works in the banking sector were carried out by Ogbodo, Ahanalu and Abiahu (2017) titled effect of intellectual capital on the financial performance of quoted deposit money banks in Nigeria, covering six years (2010-2015). A sample of fifteen banks was used, while the independent variables were HCE, SCE and CEE and the dependent variable was ROA. The regression analysis revealed a significant relationship between intellectual capital and financial performance of deposit money banks.

Working on three banks in Nigeria, Zenith, Fidelity and United Bank for Africa (UBA), Onyekwelu, Okoh and Iyidiobi (2017) obtained secondary data for ten years (2004-2013) and after regression analysis, empirical results revealed that Intellectual Capital has a positive and significant effect on bank's financial performance. Proxies for Intellectual Capital were HCE, SCE and CEE. For financial performance, ROA was used as a proxy.

Delving into the food and beverages group in Nigeria, Apiti, Ugwuoke and Chiekezie (2017) in their work investigated intellectual capital management and organisational performance in selected food and beverage companies in Nigeria. Four selected companies (Guinness Nigeria Plc, Nestle Nigeria Plc, Unilever Nigeria Plc and 7up Bottling Company Plc) were used as a sample while secondary data was obtained for the Independent variables (VAIC and Intellectual Capital Efficiency) while the dependent variable was ROA. After carrying out Pearson moment correlation analysis and linear regression analysis the results revealed a significant relationship between intellectual capital and firms 'performance. This study was done for four years (2008-2011).

On the contrary, Yusuf (2013) worked on Nigerian banks by investigating the relationship between their human capital efficiency and their financial performance. The study concluded that there is no significant impact of efficient utilization of human capital on the return of equity of banks.

### *Foreign*

Using the value-added intellectual coefficient approach to investigate the banking sector listed in Iraq Stock Exchange, Alabass (2019), in his work, Intellectual capital and financial performance used Intellectual capital as the independent variable and this was measured by combining Capital-Employed Efficiency, Human capital efficiency and Structural Capital Efficiency. Return on assets and return on equity were proxies for financial performance. Regressing simultaneously the two models using the dependent variables: return on assets and return on equity this was then followed by a value-added intellectual coefficient approach. The findings revealed that generally, IC had a significant effect on financial performance. CEE, HCE and SCE have a positive and significant relationship with ROA and ROE. While SCE had no significant effect on return on equity. A comparison of the independent variables, indicated that the impact of HCE is much stronger on financial performance than the other components of Intellectual Capital.

Empirical tests on listed logistics companies in the Stock Exchange of Thailand (SET), Zeng and Wudhikarn (2018) in their work Relationships between Intellectual Capital, Firms' Market Value and Financial Performance in Thailand reported that the results revealed that VAIC has a positive effect on Market-to-Book Value (MB) and Return on Assets (ROA). Although, VAIC is not significantly associated with ROE, EP (Employee Productivity) and RG (Revenue Growth). The independent variables were VAIC, CEE, HCE, SCE, Dependent variables were MB (Market-to-book Value), ROA, ROE, EP (Employee Productivity) and RG (Revenue Growth). While the control variables were FSIZE (Firm Size) and Leverage. Study results revealed that intellectual capital has a positive effect on firm value and profitability. Previous studies, however, have shown that profitability serves as an intervening variable in a causal relationship between intellectual capital and firm value, as this was corroborated by Nuryaman (2015) in his work 'the influence of Intellectual Capital on firm's value with financial performance as intervening variable' using Intellectual Capital as VAIC model, the price-to-

book value (PBV) (price-value/book value) was used as Firm Value. Firm Performance was hypothesized as profitability and this was measured by Return on Assets (ROA), return on total equity (ROE), and net profit margin (NPM).

Also, the work Arslan and Zaman (2015) buttressed this as well. Their study titled intellectual capital and its impact on financial performance: a study of oil and gas sector of Pakistan, used VAIC, HCE, SCE, and CEE as independent variables to measure intellectual capital while ROE, ROI and EPS were used as dependent variables used to proxy financial performance. Secondary data was obtained for five years (2007-2011). Multiple linear regression analysis revealed that HCE and SCE have a positive and significant relationship with ROE and ROI (Return on Investment). They further postulated that VA should be considered an important aspect of VAIC and this posted a positive and significant relationship with EPS i.e. Firm performance.

Parham and Heling (2015) studied the efficiency of human capital and its impact on the financial performance of thirty-three (33) Dutch production companies for a period of six years (2007 – 2012). To measure corporate performance were return on equity, employee productivity and return on asset. The results discovered that there is a positive relationship between human capital efficiency and return on equity, employee productivity and return on asset. To add to that, a strong significant relationship between human capital efficiency and employee productivity was recorded. VAIC methodology and multiple linear regression model was employed.

Also, in Asia, specifically Indonesia Ari Barkah, Dominique and Caroline (2013) tested The Impact of Intellectual Capital on a Firm's Stock Return: Evidence from Indonesia. The dependent variable used was firm Market value, while Independent Variables was VAIC<sup>tm</sup> (intellectual capital coefficient) and Control Variables Were Size and Leverage. It was discovered that HCE had a significant impact on Stock return. Though, the results revealed that IC affects stock return growth but no impact of IC on current stock return. The methodology employed was VAIC and regression model.

Pal and Soriya (2012) investigating Indian Pharmaceutical and Textile Industries for Intellectual Capital Performance discovered that no significant relationship exists between VAIC and Market /Book value ratio after testing Profitability, intellectual capital, productivity, and market valuation.

Veltri and Sylvestri (2011), using multiple regression techniques and Ohlson model in their study, also IC information, with Market value, Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) Capital Employed Efficiency (CEE) as variables. Their results revealed that there is a positive significant relationship between Intellectual Capital and the market value of firms. The title of the work is 'Direct and indirect effects of Human Capital on firm value: evidence from Italian Companies.

Ahangar (2011) sought out to study the relationship between intellectual capital and financial performance: An empirical investigation in an Iranian Company. One business company was used in Iran using data for thirty (30) years. Using cross-sectional data relating to Human Capital Efficiency (HCE), Physical Capital employed Efficiency and Asset Turnover Ratio (ATO) and growth in sales, his findings revealed that HCE, CEE and ATO significantly affect company performance (growth in sales). HC is more efficient than structural capital (SC) in

creating value. Techniques used were Multiple Regression analysis, using Ordinary Least Square Technique.

Employees, firm size and profitability in U.S. manufacturing industries was the topic of the work of Becker-Blease, Kaen, Etebari and Baumann (2010). They investigated the association between firm size and profitability within 109 SIC four-digit manufacturing industries in the United States. Employee size, Total Assets and sales were the independent variables while EBITDA Margin (cash flow margin), EBIT Margin, EBITDA to total assets and EBIT to total assets were the dependent variables. With the use of Partial Regression analysis, the empirical results revealed that the association between size and profitability is industry-specific and needs to be examined on an industry-by-industry basis. More revelations indicated that the profitability of most manufacturing firms as measured by EBITDA Margin (cash flow margin), EBIT Margin, EBITDA to total assets and EBIT to total assets either increases at a decreasing rate and then falls or bears no relation to size measured by the number of employees. The empirical results are consistent with a theory of firm size that posits trade-offs between economies of scale and organizational costs and with a theory that firms possess certain competencies that allow them to offset the advantages such as economies of scale often attributed to large firms. Corroborating, the above, firm size measured by sales and assets, indicate that a lower number of employees indicate more profitability of the firms. And, for firms of a given size, as measured by the number of employees, the fewer the assets, and the higher the sales, the more profitable the firm is. No indication was observed that small manufacturing firms are more profitable than larger firms. An association whereby industry profitability was established between the functional form of such industries and the number of business segments typical of firms within that functional form.

Zéghal and Maaloul (2010) working on commercial and industrial companies in the United Kingdom measured intellectual capital investigated its connection with financial performance and market value. The methodology employed was the value-added intellectual coefficient (VAIC<sup>tm</sup>) method. A sample of three hundred United Kingdom companies was obtained and they were classified into high-tech, traditional and services groups of industries. Through the Value-Added Scoreboard, data was obtained from the UK Department of Trade and Industry. The empirical analysis was conducted using correlation and linear multiple regression analysis. The results of this study revealed that companies' IC has a positive impact on economic and financial performance. However, for high-tech industries results revealed a significant association between IC and stock market performance. Further revelations indicate that capital employed maintains the main basis of the stock market and financial performance irrespective of the fact that it had a negative impact on economic performance.

Nik Maheran and Md Khairu (2009) investigated intellectual capital efficiency and its performance in the Malaysian financial sector for the year 2007. Eighteen companies' data were obtained for the investigation. The results revealed that intellectual capital has significant and positive relationships with the company's performance measured by profitability and Return on Assets.

On the contrary, Puntillo (2009), investigating intellectual capital and business performance in Milan Stock Exchange Italian banking industry reported a negative relationship between market value and Intellectual Capital. In this case, the Value-Added Intellectual Coefficient (VAIC) was used as the efficiency measure of capital employed and firms' market-to-book value ratios. The scope was between 2005 – 2007 (three years)

Using VAIC and Tobin-q as independent and dependent variables respectively Pulic and Bornemann (1997) in their study 'The physical and Intellectual Capital of Austrian Banks' concluded after their analysis that there is a positive correlation between Intellectual Capital and Financial Performance.

Bassi and Van Buren (1999) using VAIC methodology and regression model, VAIC and PBV (Price to Book Value) as variables for Valuing investments in intellectual capital concluded that there is a positive relationship between VAIC and financial performance. This was obtained after examining five hundred United States corporations.

The following year, in his work 'VAIC- Accounting tool for IC management' using VAIC, HCE, SCE and CEE for his investigation, Pulic (2000b) concluded that there exists a significant relationship between Value Added Intellectual Coefficient and firm Value. This was carried out on seventy-five (75) South African public traded companies.

Still, in Taiwan, Shiu (2006) also applied VAIC<sup>TM</sup> to measure the extent and ability of a company to create value. The scholar investigated 80 Taiwan listed technological firms based on their special attribute of being intelligent-intensive. The regression results demonstrated that capital employed efficiency (CEE) and human capital efficiency (HCE) have a significantly positive effect on profitability whereas structural capital efficiency (SCE) has a negative effect. The results for VAIC<sup>TM</sup> documents revealed that value creation efficiency increases profitability and market valuation but decreases productivity.

Retrieving data of companies from Bursa, Malaysia Main Board for the period 2005-2006, Hazlina and Zubaidah (2008) examined intellectual capital and performance of those listed companies. They deduced a significant positive relationship with firms' profitability. However, for companies listed in Main and Second Boards there revealed no significant relationship between intellectual capital value and firms' market valuation.

Investigating S&P 500 companies for market value and Intellectual capital, Wang (2008) posited that there is a positive significant relationship between Intellectual Capital and market Value, after using multiple regression techniques on data relating to IC and company market value.

### **Gap in literature**

The objective of this research is to investigate the effect of Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE) and Employee Size on the Market value of consumer goods companies in Nigeria, which hitherto to the best of the researcher's knowledge having investigated other empirical works had not been tested, thereby insinuating an industry/sector and location gap. Which is being filled in this study.

Due to the data available, the period involved is ten (10) years (2010 – 2019), this is also unique to this work, thereby crystallizing a period gap which this work is filling.

Having brought on board in this work, Tobin's Q as the dependent variable, while Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE) and Employee Size as independent variable plus Firm Age and Leverage as control variable have to a reasonable extent demonstrated a unique/ peculiar set of variables with

emphasis on the introduction of employee size which empirically has not been tested on the consumer goods sector in Nigeria thereby creating a variable gap which is being filled in this study.

### 3. Methodology

#### Research Design

*Ex-post facto* design was adopted for this study since the researcher relied on historic (secondary) accounting data obtained from accounts of active companies listed on the Nigeria Stock Exchange (NSE) for the period 2010-2019 (ten years).

#### Population and sample of the study

The target population for the study is Twenty- one (21) listed companies quoted on the Nigerian Stock Exchange as at 1<sup>st</sup> August 2020. However, the sample size of the study from the population is made up of seventeen (17) listed consumer goods companies in Nigeria through purposive sampling technique. These listed consumer goods companies are Cadbury Nig, Champion Breweries, Dangote Flour Mills, Dangote Sugar, Flour Mills of Nigeria, Guinness Nig, Honeywell Flour Mill, International Breweries, Mcnichols Consolidated, Nascon Allied, Nestle Nig, Nigeria Breweries, Nigerian Enamelware, Nigerian Northern Flour Mill, Pz Cussons, Unilever Nig, and Vitafoam Nig.

#### Nature, Sources and method of data collection

Quantitative secondary data collection method was employed by collecting relevant data from Nigerian Stock Exchange factbook, financial reports of the companies from audited annual financial reports, income statements and financial position of the companies' accounts in Nigeria.

#### Method of Data Analysis

The multiple regression analysis using Ordinary Least square (OLS) was adapted to test the effect of Intellectual Capital Efficiency on Market Value of listed consumer goods companies in Nigeria.

#### Model Specification

This study adopted the model used by Ahangar (2011) modified to examine the effect of Intellectual Capital Efficiency on Market Value

$$TQ = f(HCE, SCE, CEE, ES | FAGE, LEV) + \varepsilon \dots\dots\dots 1$$

$$TQ_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 ES_{it} + \beta_5 FAGE_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \dots\dots\dots 2$$

Where: TQ =Tobin's Q, HCE = Human Capital Efficiency, SCE = Structural Capital Efficiency, CEE = Capital Employed Efficiency, ES = Employee size

In defining the multiple regression models the following control variable would be used

FAGE = Firm Listing age,

LEV which is Leverage =  $\frac{\text{Total Debt}}{\text{Total Assets}}$

$\varepsilon$  = error term,  $i$  = Cross-section of active consumer goods companies quoted in the NSE,  $t$  = Period which is (10) years review of active consumer goods companies quoted on the NSE.  $\beta_0$  = Intercept coefficient, where  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$  and  $\beta_6$  represent Coefficient for each of the independent variables.

### **Variables Definition**

#### ***Dependent Variable***

The dependent variable is represented by Market Value which is proxied as Tobin's Q (TQ) as derived by

$$TQ = \frac{(\text{Market Capitalization} + \text{Total Liabilities}) - \text{Cash flow}}{\text{Total asset}}$$

#### ***Independent Variable***

The independent variables are Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Employee Size (ES).

- i. HCE is conceptualised in this work as the value added by way of Gross profit in a firm per staff cost. HCE=

$$\frac{\text{Revenue} - \text{cost of revenue}}{\text{Staff Cost}}$$

- ii. Structural Capital Efficiency (SCE) in numbers is computed as Revenue less cost of revenue and staff cost divided by Revenue Less Cost of Revenue. SCE=

$$\frac{\text{Revenue} - (\text{cost of Revenue} + \text{staff cost})}{\text{Revenue} - \text{Cost of Revenue}}$$

- iii. Capital Employed Efficiency in numbers is computed as Revenue less cost of revenue divided by total asset less intangible asset.

$$CEE = \frac{\text{Revenue} - \text{cost of revenue}}{\text{Total asset} - \text{intangible asset}}$$

- iv. Employee Size (ES) is conceptualised as the total number of employees engaged and working in the respective companies during the period under review

#### ***Control Variable***

This is being controlled by Firm Age (FAGE) and leverage (LEV).

- i. The concept of firm listing age is the length of time measured in years for which the company is listed on the relevant Stock Exchange.
- ii. Leverage (LEV) is conceptualised as the debt owed by business entity per asset cost.

$$\text{LEV} = \frac{\text{Total Debt}}{\text{Total Assets}}$$

#### 4. Data Analysis and Interpretation

**Table 4.1: Descriptive Statistics of the variables from Consumer Goods Companies in Nigeria**

##### Summary statistics

	N	Mean	Median	St.Dev	max	min
tq	170	2.144	1.545	1.726	9.29	-1.3
hce	167	4.888	3.6	8.704	98.03	-1.09
sce	170	.562	.73	1.401	7.48	-13.62
cee	170	.299	.275	.207	1.66	-.07
es	170	1394.606	835.5	1448.589	7326	39
fage	170	29.794	35	14.485	55	2
lev	170	61.671	60.71	27.98	224.11	-62.03

**Source: Researcher's computation (2020).**

Table 4.1 shows the count (total number of data/observations) for each of the variables, mean (average), median (the middle value after sorting from highest to lowest values), standard deviation, maximum values, and minimum values. The results in Table 4.1 provided some insight into the nature of the selected Nigerian quoted consumer goods companies that were used in this study. The measures of central tendency are indicated in the mean and median values, while the measure of dispersion is indicated in the value of standard deviation (how far the observation is from the sample average).

First, it was observed that on the average, over the ten (10) year period (2010-2019), the sampled listed consumer goods companies in Nigeria were characterized by positive mean value of market value (2.144) proxy as tobin Q(TQ). This is an indication that the listed companies used for this study recorded a positive market value over the period covered by this study and this is encouraging for a growing economy like Nigeria.

Similarly, it was also observed that on the average, over the ten (10) year period (2010-2019), all the explanatory variables (HCE, SCE, CEE, ES, FAGE, and LEV) used for this study were characterized by positive mean values of 4.888, 0.562, 0.299, 1394.606, 29.794 and 61.671 respectively. This is an indication that the listed companies used for this study have engaged in one form of intellectual capital development or the other, over the period covered by this study and that such engagement positively influence the market value of such companies.

**Table 4.2: Normality Statistics of the Data Used for the Study**

Skewness/Kurtosis tests for Normality  
----- joint -----

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
tq	170	0.000	0.000	51.370	0.000
hce	167	0.000	0.000	.	0.000
sce	170	0.000	0.000	.	0.000
cee	170	0.000	0.000	68.870	0.000
es	170	0.000	0.000	54.600	0.000
fage	170	0.003	0.000	26.350	0.000
lev	170	0.000	0.000	62.290	0.000

Table 4.2 which presents the normality statistics for the variables specifically shows the skewness and kurtosis of the data. Skewness measures the degree of asymmetry of the observations while Kurtosis is a measure of the height and sharpness of the central peak relative to that of a standard bell curve. As for Tobin Q (TQ), Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), Employee Size (ES), Firm Age (FAGE) and Leverage (LEV) the skewness data are all 0 (zero) as this indicates that the distribution is symmetric around its mean.

The kurtosis value for the above-stated variables are 0 (zero) and 0 is less than 3 ( $0 < 3$ ) which is indicative of platykurtic. This is interpreted as negative kurtosis (flattened curve) which is indicative that more values of the observation are less than the variable average. These are significant at 1%.

Lastly, in Table 4.2, which tests for normality or the existence of outliers or extreme values among the variables, shows that all the variables are not normally distributed and this is significant at 1% level of significance. This means that the variables bear outliers which will likely distort our conclusion and produce spurious results. Therefore, the test fails to accept the hypothesis of normality which is the null since the p-value is less than 0.05 thereby indicating significance. Failing the normality tests therefore implies that the data does not fit the normal distribution. This also implies that the least-square regression model may not produce the best linear unbiased estimation.

### Diagnostic Test to Check for Multicollinearity Problem, using Correlation Matrix.

Multicollinearity is a near perfect/high correlation between any two (2) independent variables. It is a problem of cross-sectional data and our data have cross sectional characteristics as it cuts across seventeen (17) listed consumer goods companies in Nigeria. When there is multicollinearity, all the t-values, F-statistics value becomes invalid and the  $R^2$  of the regression result becomes unreliable. The study on trying to diagnose for the presence of multicollinearity in the data used, as well as evaluating the association among the variables adopted, employed the Pairwise correlation coefficient (correlation matrix), Variance Inflation Factor (VIF) analysis and heteroscedasticity Test. The results obtained are presented in Table 4.3, 4.4 and 4.5 below.

**Table 4.3: Pairwise Correlation Matrix of the Variables Used for the Study**

. pour tq hce sce cee es fage lev, obs sig star (0.05)

	tq	hce	sce	cee	es	fage	lev
tq	1.0000 170						
hce	-0.0498 0.5226 167	1.0000 167					
sce	-0.0142 0.8537 170	0.0873 0.2617 167	1.0000 170				
cee	0.5636* 0.0000 170	0.2249* 0.0035 167	0.1183 0.1246 170	1.0000 170			
es	0.0840 0.2763 170	-0.1124 0.1483 167	0.0630 0.4142 170	0.0493 0.5231 170	1.0000 170		
fage	0.2461* 0.0012 170	-0.2283* 0.0030 167	-0.0251 0.7455 170	0.2701* 0.0004 170	0.1537** 0.0454 170	1.0000 170	
lev	0.0755 0.3276 170	0.2903* 0.0001 167	- 0.2148* 0.0049 170	-0.1037 0.1783 170	-0.0085 0.9120 170	-0.0552 0.4750 170	1.0000 170

**Source: Researcher's computation (2020) using Stata 13.0 statistical package.**

Correlation statistics are used to determine the bivariate linear relationship between two continuous variables. Correlation measures the strength and direction of the association. Correlation in terms of strength can either be weak, strong or moderate. Once the absolute value is  $\geq 90\%$  it is said to be strongly correlated. If the absolute value is  $\leq 30\%$ , it is said to be weakly correlated, but if the absolute value is between 30 – 89 it is said to be moderately correlated. The positive or negative direction is depicted by the positive or negative signs respectively.

From the pairwise correlation statistics shown above, the association between TQ (dependent variable) and the independent variables which are also the variables of interest (HCE, SCE, CEE and ES) have been revealed to have (-0.05[5%], -0.01[1%], 0.56[56%] and 0.08[8%]) absolute values respectively. This indicates that the relationship between TQ and HCE and also between TQ and SCE are negative and weakly associated. The relationship between TQ and CEE and also between TQ and ES are positive and moderately and weakly associated respectively. Though the moderate association between TQ and CEE is significant at 1% level of significance.

For the control variables FAGE and Leverage, the result indicates that the relationship between TQ and FAGE and also between TQ and LEV are positive but weakly associated as indicated by scores of 0.25[25%] and 0.08[8%] respectively. We notice that no two explanatory variables were perfectly correlated. This means that there is no problem of multi-collinearity between the explanatory variables. Multi-collinearity usually results to wrong signs or implausible magnitudes in the estimated model coefficients obtained. There will also be bias in the standard errors of the coefficients.

The next diagnostic test is the Variance Inflation Factor of the independent variables (VIF). This is popularly called multicollinearity test. This is conducted to further check if the independent variables are highly correlated with one another.

**Table 4.4: Variance Inflation Factor Test Result of the Variables Studied**

Variable	VIF	1/VIF
-----+-----		
hce	1.34	0.748238
cee	1.23	0.812132
lev	1.21	0.829423
fage	1.20	0.834681
sce	1.09	0.919470
es	1.04	0.963892
-----+-----		
Mean VIF	1.18	

The mean VIF revealed a value of 1.18 and this is less than 5. This implies there is no multicollinearity problem on our explanatory variables. Here no two explanatory variables are perfectly correlated. This means that there is no multicollinearity problem in our model. Multicollinearity between explanatory variables may result in wrong signs in the estimated model coefficients and may bring about the bias of the standard errors of the coefficients.

**Table 4.5: Heteroscedasticity Test**

This is a diagnostic test to test the stability and the risk in the result. This is otherwise known as constant variance test, which is an assumption of linear regression. The Ordinary Least Square regression assumes that the variance of the error term is constant. If error terms do not have constant variance, they are said to be heteroscedastic meaning differing variance.

Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity rule states that:  
 Ho: Constant variance

Variables: fitted values of tq  
 chi2(1) = 206.69  
 Prob > chi2 = 0.0000

The Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity revealed that the hypothesis is significant and so the error variance is not constant. This is shown in the chi2 result at 1 degree of freedom, chi2 (1) = 206.69 and a p-value of Prob > chi2 = 0.0000. Which indicates that the variance is not constant at 1% level of significance. There exists significant Heteroscedasticity. This negates one of the assumptions of regression, thereby indicating that regression analysis results may be spurious or be biased.

Due to the foregoing, the Generalised Least Square (GLS) technique is employed. The GLS technique is a technique for estimating the unknown parameters in a linear regression model when there is a certain degree of correlation between the residuals in a given regression model. The GLS estimator of the coefficients of linear regression is a generalization of the Ordinary Least Square (OLS) estimator. It is used in situations whereby the OLS estimator is not the Best Linear Unbiased Estimator (BLUE).

As has been demonstrated the diagnostic test score indicated a significant Heteroscedasticity, evidence of autocorrelation and the hypothesis for normality was rejected which violates the Gauss-Markov theorem for linear statistics estimation. Whereby the assumptions of Gauss-Markov theorem are not satisfied, the GLS is employed as the Best Linear Unbiased Estimator (BLUE) (Marco, 2017).

For the values of employee size (ES), firm age (FAGE) and leverage (LEV) the log-transformed values are used for the regression. This is to make data conform to the assumption of inferential data which is the normality of frequency distribution and thereby make the statistical analysis results from these data become more valid.

**Testing of Hypotheses Formulated for Listed Consumer Goods Companies Firms in Nigeria.**

The model for this study is stated as follows:

$$TQ = f(HCE, SCE, CEE, ES | FAGE, LEV) + \varepsilon \dots\dots\dots 1$$

$$TQ_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 ES_{it} + \beta_5 FAGE_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \dots\dots\dots 2$$

In other to examine the impact relationships between the dependent variable Tobin Q (TQ) and the independent variables (HCE, SCE, CEE, ES, FAGE, and LEV) and to also test the given formulated hypotheses, the study used a panel multiple regression analysis, using fixed and random effect regression analysis, owing to the fact that the data had both time series (2010-2019) and cross sectional properties (17 listed consumer goods companies in Nigeria). Fixed effect result is presented in table 4.6, random effect is presented as table 4.7. Note that the rule is that the decision to interpret either fixed or random result will be determined by Hausman test. Hausman test conducted for this study is presented as table 4.8.

**Table 4.6 Fixed Effect Generalized Least Square (GLS) Regression**

tq	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
hce	-0.007	0.011	-0.70	0.486	-0.028	0.013	
sce	-0.019	0.052	-0.37	0.712	-0.123	0.084	
cee	3.049	0.575	5.30	0.000	1.912	4.185	***
loges	0.067	0.177	0.38	0.707	-0.282	0.416	
logfage	-0.909	0.328	-2.77	0.006	-1.556	-0.261	***
loglev	0.318	0.193	1.65	0.101	-0.063	0.699	
Constant	2.473	1.661	1.49	0.139	-0.810	5.756	
Mean dependent var	2.185		SD dependent var	1.726			
R-squared	0.248		Number of obs	166.000			
F-test	7.873		Prob > F	0.000			
Akaike crit. (AIC)	419.427		Bayesian crit. (BIC)	441.211			

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 4.7 Random Effect Generalized Least Square (GLS) Regression**

tq	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
hce	-0.016	0.010	-1.54	0.123	-0.036	0.004	
sce	-0.020	0.053	-0.38	0.706	-0.124	0.084	
cee	3.557	0.542	6.56	0.000	2.494	4.619	***
loges	0.104	0.151	0.69	0.491	-0.192	0.399	
logfage	-0.357	0.250	-1.43	0.153	-0.846	0.132	
loglev	0.339	0.193	1.76	0.079	-0.039	0.718	*
Constant	0.247	1.391	0.18	0.859	-2.480	2.974	
Mean dependent var	2.185		SD dependent var	1.726			
Overall r-squared	0.287		Number of obs	166.000			
Chi-square	49.497		Prob > chi2	0.000			
R-squared within	0.232		R-squared between	0.321			

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 4.8: Hausman Test**

	Coef.
Chi-square test value	5.673
P-value	.461

**Source: Researcher's computation (2020)**

The Hausman test conducted shows a chi-Square Statistics value of 5.673 with a Probability value of 0.461. This probability value is not statistically significant since the P-value is more than 10%. Therefore, the rule is that if the p-value is significant (i.e. P-value < 10%), interpret fixed effect result, otherwise, use the random effect result and from our Hausman result, our P-

value is not significant. Therefore, we interpreted Random effect result (table 4.7) for our analysis.

The Random Effect Generalized Least Square (GLS) Regression analysis revealed 166 observations were used (this simply means sample size) and Chi-square of 49.497 and a p-value of 0.000, which is indicative that the model for this study is valid with a significant value of 1%. This explains the extent to which the explanatory variables jointly affect the dependent variable and this is significant at 1%.

The R-squared test is a diagnostic test to check the validity of the regression statistics. This is called the coefficient of determination test or goodness of fit test. It is used to test the extent to which all the independent variable explains the dependent variable. This is the variation in the dependent variable explained by the regressors or independent variables. For Random Effect Generalized Least Square (GLS) Regression analysis, it makes use of both the R-squared within and R-squared between thereby the average is the overall R-squared is 0.287. This is an indication that all the independent variables jointly explain about 29% of the systematic variations in market value, proxied as tobin q (TQ) of our sampled companies over the ten-year period (2010-2019) while 71% of the systematic variations are captured by the error term.

## **5. Discussion of Findings**

### **Human Capital Efficiency and Market Value;**

Human capital efficiency variable score was found to have an insignificant inverse relationship with market value of consumer goods companies in Nigeria, over the period covered by this study. This supports the findings of Yusuf (2013), Kahn and Raushan (2017), and Deep and Narwal (2014).

Conversely, our finding negates the findings of Ari Barkah, Dominique, and Caroline (2013), Gurowa and Abdulwahab (2018), and Veltri and Sylvestri (2011). Based on our study, we therefore conclude that HCE does not significantly influence Market value of consumer goods companies in Nigeria.

### **Structural Capital Efficiency and Market Value:**

Structural Capital Efficiency (SCE) score was found to have an inverse relationship with market value of consumer goods companies in Nigeria. Although this influence is not statistically significant. This finding therefore supports the findings of Alabass (2019). and Kujansivo and Lonnqvist (2007) but negates the findings in the work of Arslan and Zamad (2015), and the works of Onyekwelu, Okoh and Iyidiobi (2017) was negated as well. Based on our study, we therefore conclude that SCE does not significantly influence Market value of consumer goods companies in Nigeria.

### **Capital Employed Efficiency (CEE) and Market Value:**

Based on our findings, Capital Employed Efficiency score was found to have a positive significant influence on market value of consumer goods companies in Nigeria. Capital Employed Efficiency encourages an increase in company Market Value. Financial capital investment in tangible assets such as machinery, computer hard wares and soft wares is very

much encouraged. Based on the resource-based theory, the results prove that consumer goods companies can enhance market value by emphasizing Capital Employed Efficiency.

Our findings therefore corroborate the findings of Alabass (2019), Ahangar (2011), Veltri and Sylvestri's (2011), Shefiu, Noraza and Saleh (2017) and the works of Apiti, Ugwuoke and Chiekezie (2017). The results, however, negates the work of Oyedokun and Saidu (2018).

Evident from the analysis, the study rejects the null hypothesis and accepts the alternate hypothesis. Consequently, this concludes that there is a direct (positive) significant effect of Capital Employed Efficiency on market value in consumer goods companies in Nigeria.

### **Employee Size and Market Value:**

Employee Size (ES) as explanatory variables was found to have a positive but insignificant influence on market value of consumer goods companies in Nigeria. Our findings are in line with the work of Becker-Blease et al. (2010). Based on the insignificant results obtained it concludes that the null hypothesis is accepted.

### **Firm Age (FAGE), Leverage (LEV) and Market Value:**

Based on our results we found that Firm Age (FAGE) and Leverage (LEV) scores posted negative and positive effects respectively though with an insignificant influence on market value of consumer goods companies in Nigeria thereby indicating that they do not drive market value of listed consumer goods companies in Nigeria. Our findings on Firm Age (FAGE) supports the findings of Dioha, Mohammed and Okpanachi (2018) while that of Leverage (LEV) negates the findings Alabass (2019).

## **6. Summary, Conclusion and Recommendations**

### **Summary**

1. Human Capital Efficiency (HCE) has a negative but no significant effect on the Market value of listed consumer goods companies in Nigeria.
2. Structural Capital Efficiency (SCE) has a negative but no significant effect on Market Value of listed consumer goods companies in Nigeria.
3. Capital Employed Efficiency has a positive significant effect on Market Value of listed consumer goods companies in Nigeria. This is statistically significant at 1%.
4. Employee Size has a positive but no significant effect on Market Value of consumer goods companies' in Nigeria.

### **Conclusion**

The results revealed that CEE has positive significant effects on Market Value. On the contrary, HCE and SCE negatively affect Market Value though they are not statistically significant. Revelations for Employee Size indicate a positive but insignificant effect on market value. Invariably Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Employee Size (ES) do not significantly affect Market Value. The study, therefore recommends that CEE (Capital Employed Efficiency) should be encouraged by consumer goods companies in Nigeria.

## Recommendations

Sequel to the findings of the study, the following recommendations are made:

1. The study recommends that careful evaluation/monitoring of value added by human resources should be conducted by consumer goods companies in Nigeria such that the benefit do not trade-off economies of scale thereby affecting market value. Advantages can be won by computerizing some processes and the use of machines and robots and thereby reducing human resource hiring and invariable their associated costs.
2. Alternative to human and structural intervention should be introduced. These may include, Artificial Intelligence (AI), machine learning, smart assistants which could be deployed to the organizations through the provision of tangible assets. These would help introduce state of the art organizational processes and culture and thereby minimize structural procedures but yet achieve set goals and objectives.
3. Capital Employed Efficiency should be encouraged. Financial capital investment in tangible assets such as machinery, computer hard wares and soft wares is very much encouraged. Based on the resource-based theory, the results prove that consumer goods companies can enhance market value by emphasizing Capital Employed Efficiency.
4. Human resources/manpower should be de-emphasised while machine/artificial intelligence should be encouraged as this tends to affect Market Value positively and significantly too.

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