

# INTELLECTUAL CAPITAL EFFICIENCY AND MARKET-BASED FINANCIAL PERFORMANCE: EVIDENCE FROM LISTED CONGLOMERATE COMPANIES

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## Abstract

**How to cite this paper:** Sulaiman, E. A., Kasum, A. S., & Musa, W. A. (2021). Intellectual capital efficiency and market-based financial performance: Evidence from listed conglomerate companies. *Corporate & Business Strategy Review*, 2(2), 31–42.  
<https://doi.org/10.22495/cbsrv2i2art4>

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**ISSN Online:** 2708-4965  
**ISSN Print:** 2708-9924

**Received:** 04.02.2021  
**Accepted:** 20.12.2021

**JEL Classification:** M12, M41, M52  
**DOI:** 10.22495/cbsrv2i2art4

Having observed the rate at which dissimilarity occurs between market and book value, and management ignorance concerning the impact intellectual capital disclosure has on companies' values spurred the interest to probe the association between the efficiency of value-added intellectual coefficient (VAIC) and market-based financial performance of listed Nigerian conglomerate companies. To accomplish the purpose of this study, secondary data were employed and extracted from annual audited reports of listed conglomerate companies in Nigeria from the period of 2010–2018. The data obtained were subjected to static panel data regression analysis technique. The random-effects model was adopted because the empirical result from Breusch and Pagan Lagrangian multiplier (BP-LM) and Hausman tests chose it over the fixed-effects model to produce better results. This study revealed that the value-added efficiency of capital employed (VACA), value-added efficiency of human capital (VAHU), and value-added efficiency of structural capital (STVA) are the drivers of intellectual capital in the conglomerate sector. This study concluded that elements of intellectual capital have a strong power on market-based financial performance. This study recommends that information on intellectual capital components should be reported in ways they deem fit by developing a model of intellectual capital disclosure that complies with the International Accounting Standard Board (IASB).

**Keywords:** Intellectual Capital, Intellectual Capital Efficiency, Market-Based Financial Performance, Conglomerate Companies, Value-Added Intellectual Coefficient, Nigeria

**Authors' individual contribution:** Conceptualization — E.A.S.; Methodology — E.A.S. and W.A.M.; Investigation — A.S.K.; Resources — E.A.S.; Writing — E.A.S. and W.A.M.; Supervision — A.S.K.; Funding Acquisition — E.A.S.

**Declaration of conflicting interests:** The Authors declare that there is no conflict of interest.

## 1. INTRODUCTION

It is a new dawn in the business world. The business world no longer revolves around the industrial-based economy but the knowledge-based economy. In essence, the business world has stopped rotating

around the industrial-based production system but the knowledge-based production system. The industrial-based production system focused greatly on tangible assets like land, labour, and physical capital in measuring the progress of companies. While a knowledge-based production

system involves the application of advancement in science and technology, the expertise and knowledge of employees of corporate companies can be described as intellectual capital (IC). This can be likened to how machines replaced humans and the animal workforce. Knowledge has now become the driver of corporate companies. Blundell-Wignall, Atkinson, and Lee (2008) made it known these days lots of companies invest in research and development, administrative systems and computers, customer relations, workers training, etc. These investments are tagged as IC. These ICs are on the rise and contending with financial capital investments as well as physical assets.

Carlucci, Marr, and Schiuma (2004) opined that the present-day business world climate is a competitive one in which the only certain thing is uncertainty. They similarly viewed that knowledge is considered to be the distinctive factor required for business success and the foundation for a competitive edge over other companies. It can be inferred that knowledge is an essential strategic resource required by companies for linking the value integrated into their products based on the improvement of their knowledge resource. Companies in some industries such as software, finance, pharmaceutical, banking, hotel, etc., rely largely on IC for their revenues while manufacturing companies rely on both physical assets and IC to sharpen their market superiority (Ahangar, 2011).

The quest for a suitable method of evaluating intellectual capital efficiency brought about the most common that is used in evaluating the efficiency of value-added by a company's intellectual capability. The common evaluator — value-added intellectual coefficient (VAIC) — was developed by Pulic (1998).

The customary or traditional accounting model used by enterprises operating the industrial system of production focuses mainly on financial and physical assets and overlooks a whole lot of IC assets (Zeghal & Maaloul, 2010).

Alipour (2012) similarly claims that determining IC is considered vital for comparison among corporations, to assess actual worth, or monitor and control development over time. Chen, Cheng, and Hwang (2005) argued that stakeholders appreciate firms that possess high IC efficiency and also believe that companies that possess high IC efficiency generate more profit as well as experience income development in preceding and succeeding years.

This study is motivated by the rising difference concerning book value financial performance and market value financial performance of firms, as well as ignorance of directors of companies in Nigeria in respect to the impact of intellectual capital and, as such, do not determine and manage the constituents of intellectual capital.

Going by the above problems which motivated this study, research questions on the effect of intellectual capital constituents efficiency on the market-based financial performance of firms listed in the conglomerate sector in Nigeria were raised by this study.

Many research works have offered proof as regards the impact of intellectual capital efficiency in relation to the market-based financial performance of companies. Some works (Tseng & Goo, 2005; Appuhami, 2007; Pew Tan, Plowman, & Hancock, 2007; Bontis, Chua Chong Keow, & Richardson, 2000;

Cheng, Lin, Hsiao, & Lin, 2010; Salman, Yahaya, & Aliu, 2012) concluded that intellectual capital disclosure influence firms market based financial performance positively. However, other studies (Anuonye, 2015; Gan & Saleh, 2008; Kamath, 2008; Mehralian, Rajabzadeh, Reza Sadeh, & Reza Rasekh, 2012) reported a negative relationship. Also, Maditinos, Chatzoudes, Tsairidis, and Theriou (2011) established no substantial impact of intellectual capital efficiency in relation to the market-based financial performance of businesses. Lack of consensus on empirical evidence is not surprising as the market-based financial performance of firms is influenced by effective management of intellectual capital which may differ not just by firms but by industries.

In Nigeria, it has not been specifically established as to whether or not there is any affiliation as regards intellectual capital efficiency and market-based financial performance of listed firms in the conglomerate sector.

Going by the above, the research scrutinized the consequences of intellectual capital efficiency on the market-based financial performance of quoted Nigerian conglomerate companies of the Nigerian Stock Exchange.

The arrangement of the paper is as follows. Section 2 evaluates relevant works of literature. Section 3 investigates the methodology that was used to carry out empirical research on the explained and explanatory variables of the study. Section 4 presents data and discusses results obtained from data. Finally, Section 5 discusses the conclusion, limitations, and recommendations.

## 2. LITERATURE REVIEW

### 2.1. IC and components

Many meanings have been given to IC by different authors and researchers. The consensus is lacking on a clear description or meaning of IC. IC is a wide-range term that is sometimes referred to as intangible assets. A review of works of literature through disciplines shows there is an extensive collection of definitions that could be termed IC. Intangible assets, intangibles, or knowledge assets are different terms that have been used to describe IC (Bontis, 2001; Kujansivu, 2005). Consequently, IC is linked with the sustainable market superiority of a company. Also, it is mostly connected by an enterprise's assets, skills, and proficiency (Bontis, 1998, 2001; Bontis et al., 2000; Lönnqvist, 2004).

Marr and Schiuma (2001) acknowledged IC as the collection of knowledge assets that are ascribed to a company and most meaningfully add to an upgraded competitive situation of this company by adding value to defined key stakeholders.

The disclosure of IC is a discretionary practice of companies. The disclosure of intellectual capital has been regarded as a problematic issue because businesses choose not to report their IC because of the role intangibles play in a company's competitive advantage (Holland, 2003). Annual financial reports of companies are regarded as a standard origin of financial information but do not always comprise details on the intellectual capital of companies. Numerous companies that disclose IC prefer to make provision for IC performance details as

an appendix alongside their annual reports while some publish them as a separate report or statement (Kamath, 2014).

According to Abeysekera and Guthrie (2002), IC disclosure is defined as the report provided to satisfy the information needs of stakeholders who cannot give orders as regards the preparation of statements of IC to fulfil precisely all of their needs. It is important to make it clear that although there has been a lot of special attention given to IC, there are no standard approaches to the disclosure of IC. When IC started gaining prominence, particularly in the knowledge-based companies, IC disclosure was seen as valuable by managements of quite several companies which led to different models, nature, and extent of disclosure of IC between companies, between industries, and also between nations (Kamath, 2014).

A significant figure of researchers and professionals identified components of intellectual capital, human capital, structural capital, and customer (relational) capital (Bontis, 1998; Edvinsson, 1997; Holton & Yamkovenko, 2008; Mavridis & Kyrmizoglou, 2005; Ruta, 2009; Yang & Lin, 2009; Zerenler & Gozlu, 2008; Wall, 2007).

Human capital can be effectively established through enforcing adequate human resource organization conducts as such conducts impact employees' talents which then enhance human capital (Buallay, Hamdan, Reyad, Badawi, & Madbouly, 2020).

Ahangar (2011) argued that human capital is perceived as the main as well as an utmost vital intangible asset of a company. This is because he believed that human capital finally produces the products or services that consumers need or answers to their complications. Bontis, Crossan, and Hulland (2002) perceived human capital to be the distinct knowledge store of a firm embodied in its workers. Similarly, Choo and Bontis (2002) and Guerrero (2003) identified human capital as the pooled knowledge, talent, openness, flexibility, and skill of a firm's personnel to meet the demand of their jobs.

Roos, Roos, Dragonetti, and Edvinsson (1997) argued that staffs create IC from their know-how, conduct, and intellectual alertness. Bontis, Dragonetti, Jacobsen, and Roos (1999) recognised the core of human capital as the total intelligence of each worker of an enterprise. He equally viewed that human capital is imperative to being a foundation of improvement and tactical rejuvenation.

Considering the definitions given above, it can be inferred that human capital is the basis of IC because a whole lot in the existing market environs depend greatly on workers' thoughts, awareness, and expertise. Though investments in human capital are developing, there is yet to be an average estimator of how effective it is in companies' statements of financial position.

The next component of IC stated by scholars is structural capital. Roos et al. (1997) described it to be the things that remain in a firm after workers leave for their houses. Bontis and Girardi (2000) contended that structural capital covers all the non-human depots of knowledge in companies which include the databanks, organisational charts, process manuals, strategies, routines and anything

whose value to the company is higher than its material value.

Anuonye (2016) and Ahangar (2011) opined that structural capital is the helpful facility that supports human capital to perform its task within an organisation. Also, they claimed that structural capital comprises copyrights, methods, trademarks, board style, firm's goodwill, business beliefs, ability to interact, long- and short-term goals.

The connection a company shares with outer groups and individuals over a while is relational capital (Anuonye, 2016). Relational capital has to do with the overall dominant and budding properties that can be derived from personal and or structural systems (Bayraktaroglu, Calisir, & Bakak, 2019). These comprise the image of the company, commercial power, negotiating prowess, business relationships with former, current, and would-be customers (customer satisfaction and loyalty), suppliers, associates, investors, and the public at large (Starovic & Marr, 2003; Anuonye, 2016). To uphold a great notch relational capital, the company needs to display an extraordinary intelligence of selling and marketing its products and services with its group in a way that gives flexible access to clients (Chevenne et al., 2007).

Bontis et al. (1999) opined that knowledge of market networks, client plus seller dealings, as well as comprehensive knowledge as regards constitutional or business association impact, is the chief basis of relational capital. He argued further that it can be determined (though it is challenging) as a function of prolonged existence, which implies that it appreciates as time goes on.

## 2.2. Value-added intellectual coefficient model

Ante Pulic (1998) was among the first scholars with a specialization in IC research to give full attention to the relationship between IC and market-based performance. Stahle, Stahle, and Aho (2011) stated that Pulic also focused on figures of statements of financial position of firms as his basis of analysis by applying already existing IC components as regards firm's performance.

The model was developed to measure the length at which a firm creates added value as regards IC efficiency. The calculation measurement is based on:

- *human capital* (HC), depicts employees' expenses;
- *structural capital* (SC), represents the variance between value-added generated and human capital, i.e., employees' expenses;
- *capital employed* (CE), simply means the book value of the firm.

## 2.3. Market-based financial performance

Quite several researchers have carried out studies to create relationships concerning the disclosure of intellectual capital information and companies' market-based financial performance.

The maximum efficient approach to fix a firm's aims with appropriate supervision and communication of IC is by disclosing its intellectual capital (Chowdhury, Rana, & Azim, 2019).

Market-based financial performance has to do with the valuation of companies which is carried out

in the stock market. The total value of stock that belongs to a company is assessed. Al-Shubiri (2011) viewed market value as the amount to be paid to purchase a company at a particular period. The value paid by investors shows the companies' market value. The fluctuations of the market value of companies are based or affected by several factors such as profit level of companies, economic position, companies' book value, and confidence in a company's ability to create value. A number of debates have happened concerning book and market value. Customary accounting determines the book worth of a business from the business statement of financial position. Book value gives the value left when a company disposes its total assets and settles all its liabilities. Customary accounting treats only physical assets and financial capital as total assets and sometimes goodwill. Customary accounting does not account for intellectual capital which brings about underestimation of the true value of an organization.

Chen et al. (2005) discovered that stakeholders enjoy investing in firms with reputable intellectual properties since they pay greater rates compared to companies with low intellectual resources.

Salman and Mahamad (2012) believe that intellectual capital drivers such as information technology, brand, patent, advertisement, research, and development are commonly used concerning the value of companies and their influence on the total organization performance that assist investors' decision-making. Salman and Mahamad (2012) similarly opined that investors act in line with any new information that has value and ensure that the valuable information is specifically incorporated when making an investment decision.

The study is underpinned by the signaling theory which proposes communication between the explained and explanatory variables of the study. It was put forward by Michael Spence in 1973 (as cited in Connelly, Certo, Ireland, & Reutzel, 2011).

Signaling theory is concerned with addressing problems that emanate from information disproportionateness in any public setting. This is when a party in a transaction possesses information about a particular factor at hand than the other party. It proposes that information asymmetry must be minimized provided the party keeping supplementary information can send signals to other connected parties (Kamath, 2014).

Signaling theory focuses largely on the deliberate communication of positive information to stakeholders to convey positive, imperceptible qualities of the company to the stakeholders.

Marr, Gray, and Neely (2003) identified motives behind the measurement of IC by companies. The reasons put forward are: to communicate measures to external stakeholders, to exploit it as a source of benefit, to help formulate strategy, and to assess strategy execution.

The reasons stated above are why companies may not always prefer to disclose their IC and retain it only for internal use. The risk involved with disclosure such as legal retaliation, losing out on competitive advantage, regulatory interference, and the cost involved in the measurement of IC are some of the key motives for companies not communicating their IC to external stakeholders.

Many researchers have observed the association between intellectual capital disclosure and market-based financial performance of firms. Zeghal and Maaloul (2010) analysed the role of value-added as an indicator of intellectual capital and its impact on firms' financial and stock market performance. In 2005, 300 United Kingdom companies were sampled and used for analysis. The pooled OLS result indicated a significant positive relationship between the value-added efficiency of capital employed and stock market reaction.

In a study of 39 Iranian insurance companies, Alipour (2012) examined the influence of intellectual capital on the performance of businesses from 2005 to 2007. A partial least squares was adopted and the result portrayed a strong positive association between employed capital efficiency and firms' performance. Chen et al. (2005) explored empirically the connection between intellectual capital, companies' market worth, and financial performance. This analysis was conducted based on a sample total of 4,254 firm-year observations of companies' quoted on the Taiwan Stock Exchange (TSE) from the year 1992 to the year 2002 using multiple-stage regression to test the relationship. They discovered that firms' value-added efficiency of capital employed showed a positive influence on market value and financial performance.

However, an investigation on the relations between intellectual capital's components on companies' commercial value and financial performance of Iranian companies was conducted by Mosavi, Nekouezadeh, and Ghaedi (2012). The sample size of companies investigated was 80 Iranian companies within the period of 2006-2010 using pooled OLS method of regression. The result showed a statistically insignificant connection between the value-added efficiency of employed capital and market-based financial performance.

Ninety-six (96) Greek companies quoted on the Athens Stock Exchange (ASE), was investigated by Maditinos et al. (2011) as regards the effect intellectual capital efficiency has on the market value of firms from 2006 to 2008. Results presented a significant association concerning the value-added efficiency of human capital and performance.

In a study of 40 independent banks from 2011 to 2015, Mohapatra, Jena, Mitra, and Tiwari (2019) investigated the connection between intellectual capital and firm performance. They discovered that out of the three components of IC only human capital possesses a positive significant connection.

The influence of human capital and structural capital on firms' worth in Spain was examined by María Díez, Lizet Ochoa, Begoña Prieto, and Santidrián (2010) on 1,911 firms in 2006, using two-stage least square. The results confirmed positive affiliation concerning the value-added efficiency of human capital and business value. Muhammad and Ismail (2009) probed how efficient the value-added by human capital is with its performance in the Malaysian financial sector. Results reflected significant positive link as well as a greater effect of intellectual capital on the performance of the banking sector compared to insurance companies and brokerage firms.

Cabrita and Bontis (2008) observed the interrelationships and conducts of intellectual capital components and business performance in the Portuguese banking industry. This study made use of cross-sectional data which covered the year 2007 with 53 samples. The study employed a partial least square regression method to determine the relationships and interactions between the components of the independent variables and dependent variable. The outcome from the analysis presented a positive link between the value-added efficiency of human capital concerning business performance.

An appraisal of the effect of intellectual capital on company value was carried out by Berzkalne and Zelgalve (2014) on 64 Baltic quoted firms for 7 years (2005–2011). OLS regression method was employed to scrutinize dependent and independent variables. Findings exposed a positive and significant association between the value-added efficiency of structural capital and company value.

However, Kamath (2015) investigated the influence of intellectual capital on the financial performance and market worth of companies in India. The data used for the investigation covered a period of 6 years (2008–2013) for 30 firms across various manufacturing firms using pooled OLS. The investigation revealed a negative link between the value-added efficiency of structural capital and the market value of companies. Salman et al. (2012) also examined the effect of the value-added intellectual coefficient as regards measuring business performance in Nigeria. The year 2010 annual reports of 20 Nigerian service companies were investigated using pooled OLS, which revealed a negative connection between the value-added efficiency of structural capital and the market value of companies.

Smriti and Das (2018) employed Pulic's VAIC model and system generalized method of moment appraiser to establish the influence of IC on a firm's performance with data gathered from firms listed on the Centre for Monitoring Indian Economy Overall Share Price Index (COSPI) in India from 2001 to 2016. They discovered that quoted firms in India are efficient in their use of IC which translates to a great performance of the quoted firms.

Arslan and Kızıl (2019) equally exploited the merits of the market value/book value technique alongside with VAIC model to examine and relate IC of banks quoted on Turkey's Borsa Istanbul banking index. From the analysis companies in some industries give more attention to IC and its disclosure.

However, Xu and Liu (2020) probed the Korean industry concerning the influence of IC and its components on the performance of manufacturing companies. The probation was made with the aid of an adapted and extended VAIC model on secondary data collected from the year 2013 to 2018. Xu and Liu (2020) highlighted from their discoveries that the adapted and stretched VAIC model is better off than that of Pulic's (1998).

Weqar and Haque (2020) also conducted an empirical study regarding IC and financial performance of central public sector that are centered in India. Roles played by the components of IC were also looked into. Secondary data were collected from the Bombay Stock Exchange from

the year 2009 to 2018 and worked on with the VAIC model which identified a frail connection in relation to IC and performance as well as a poor connection between IC and market value.

Empirical findings by Ting, Ren, Chen, and Kweh (2020) revealed that IC efficiency has a significant negative relationship with firms' performance. The finding was based on examining the dynamic performance effect of IC through a value-added-based perspective. A total of 6408 firm-year observations of listed electronics companies in Taiwan from 2006 to 2017 were analyzed with the aid of ordinary least square regression.

A quantitative enquiry was also made by Soewarno and Tjahjadi (2020) examined the connection of IC and financial performance of Indonesian banks from 2012–2017. The multiple regression analysis depicts some null hypotheses backed up the adapted VAIC while the others backed up the VAIC model.

A considerable number of studies have looked at the influence of intellectual capital as regards the market-based financial performance of organisations outside Nigeria (Cabrita & Bontis, 2008; Ting & Lean, 2009; María Díez et al., 2010; Muhammad & Ismail, 2009; Abdolmohammadi, 2005; Zeghal & Maaloul, 2010; Mosavi et al., 2012; Joshi, Cahill, Sidhu, & Kansal, 2013).

However, studies in Nigeria (Onyekwelu & Ubesie, 2016; Ekundayo & Odhigu, 2016; Anuonye, 2016; Anuonye, 2015; Onyekwelu, Okoh, & Iyidiobi, 2017; Ekanem, 2017; Ibikunle, Oba, & Nwifo, 2013; Uadiale & Uwuigbe, 2011; Adekunle Suraj & Bontis, 2012) focused on the financial, pharmaceutical and telecommunication sector and no consideration was given to some important variables such as size and leverage. Therefore, this study stands out by including size and leverage and by considering the conglomerate sector.

### 3. METHODOLOGY

#### 3.1. The population of the study

On the Nigerian Stock Exchange market, a total of six (6) conglomerate goods and services firms are quoted which implies that the population of the study is six listed conglomerate firms. All the samples of the population were used by the study which is equivalent to 100%.

#### 3.2. Research design

*Ex-post facto* research design, which has to do with the use of historical data to make a decision, was employed. This research design is appropriate for this study because it is probing existing fact and utilizing existing data.

##### *Source of data*

The panel data set used for this study was obtained from the audited financial statements of six conglomerate companies from 2010 to 2018.

#### 3.3. Model specification

The adapted model was from the work of Chen et al. (2005), stated thus:

$$M/B_{it} = \beta_0 + \beta_1 VACA_{it} + \beta_2 VAHU_{it} + \beta_3 STVA_{it} + \beta_4 RD_{it} + \beta_5 AD_{it} + \mu_{it} \tag{1}$$

Though, the model is modified to suit the goal of the study. The motive for the variation is to remove research and development cost which has been accounted for by human capital efficiency (Muhammad & Ismail, 2009; Mohiuddin, Najibullah, & Shahid, 2006). Similarly, variables such as leverage

and size were controlled for. These variables have been found as plausible determinants of intellectual capital in other countries. Examples are Zeghal and Maaloul (2010) and Alipour (2012).

The model is modified thus:

$$M/B_{it} = \beta_0 + \beta_1 VACA_{it} + \beta_2 VAHU_{it} + \beta_3 STVA_{it} + \beta_4 AD_{it} + \beta_5 LEV_{it} + \beta_6 SIZE_{it} + \mu_{it} \tag{2}$$

*Explanation of models*

*M/B* = the market to book value ratios of equity measured by the market value divided by the book value of common stocks ( $\frac{MV}{BV}$ ).

*VA* = value-added measured by sales less bought-in materials and services, and depreciation.

*CE* = capital employed measured by total assets less current liabilities (*TA - CL*).

*HU* = human capital measured by total expenditure on employees.

*SC* = structural capital measured by value-added less human capital (*VA - HC*).

*VACA* = indicator of value-added efficiency of capital employed measured *VA* divided by *CE* ( $\frac{VA}{CE}$ ). It specifies the value created by a unit of capital employed during the period.

*VAHU* = indicator of value-added efficiency of human capital measured by *VA* divided by *HU* ( $\frac{VA}{HU}$ ). It reveals the value created by a unit of human capital for the period.

*STVA* = is the proportion of total value-added accounted for by structural capital measured by *SC* divided by *VA*. It shows the created value during the period by a single unit of structural capital.

*AD* = advertising expenses measured as advertising expenses divided by book value of common stocks ( $\frac{AD}{BV \text{ COMMON STOCK}}$ ).

*SIZE* = natural logarithm of total assets.

*LEV* = debt divided by total assets.

$\beta$  = intercept.

$\mu_{it} = \lambda_{it} + \mu_{it}$ .

$\lambda_{it}$  = cross-sectional difference.

$\mu_{it}$  = stochastic error term.

This study scaled some variables by capital employed in consonant with previous research works. This is done to specify the values in a unit of the scaled variables (capital employed).

**3.4. Model estimation technique and selection procedure**

This study utilizes both descriptive and inferential statistics. The mean, standard deviation, minimum

and maximum values are parameters of descriptive statistics used in this study while inferential statistics employed on the constructed panel data set is static panel data analysis with the aid of regression technique. Breusch and Pagan Lagrangian multiplier (BP-LM) tests were adopted to determine the most appropriate estimates between the pooled ordinary least square (OLS) and fixed/random effects. The Hausman test was employed to choose the most suitable model between the fixed and random estimates. The approach to know whether the effects are fixed or random is to use the Hausman (1978) test under the null hypothesis of the random-effects model. If the null hypothesis is rejected the effect is considered to be fixed and the model is then estimated by OLS. If the null hypothesis is accepted, there would be a random effect, and the model is then estimated by generalised least squares (GLS).

*A priori expectation*

The study expects a direct and significant association amongst value-added efficiency of capital employed, value-added efficiency of human capital, advertising expenses, size, leverage, and market-based financial performance but an inverse connection is anticipated amongst value-added efficiency of structural capital and market-based financial performance.

**4. DATA PRESENTATION AND DISCUSSION OF RESULTS**

**4.1. Descriptive statistics**

Each variable of the model has its descriptive statistic stated in Table 1. The table indicates the observation occurrence, mean, standard deviation, maximum and minimum values of both dependent (*VACA*, *VAHU*, *STVA*, *AD*, *LEV*, and *SIZE*) and independent (market-based financial performance) variables of the study.

**Table 1.** Descriptive statistics

<i>Variables</i>	<i>Observations</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Minimum</i>	<i>Maximum</i>
<i>VACA</i>	54	5.81	33.33963	-192.0996	53.31735
<i>VAHU</i>	54	-4611.29	32879.13	-212553.3	4054.153
<i>STVA</i>	54	8.78	214.257	-1190.133	243.3576
<i>AD</i>	54	11.75	16.55953	0.19	85.06
<i>LEV</i>	54	34.89	21.42992	2.282187	81.89223
<i>SIZE</i>	54	16.54	0.7651754	15.14662	17.893

Source: Authors' computation, 2019.

Table 1 shows the descriptive statistics of the model variables. As it can be seen, indicators of value-added efficiency of capital employed, value-added efficiency of human capital, and value-added efficiency of structural capital showed a negative minimum value indicating a decrease in the average value of the sector's intellectual capital. Other variables reveal a positive minimum value implying a value-added. Leverage and size reveal a minimum value of 2% and 15%, respectively, with a maximum value of 81% and 17%, respectively. This indicates a dilution of control and ranges of the sector total values.

#### 4.2. Testing for multicollinearity

The multicollinearity test carried out on explanatory variables employed variance inflation factor (VIF). This is essential as a result of the assumption of the OLS regression technique that there is an absence of a perfect linear relationship among the explanatory variables. Hence, this gives room for exactness from the estimator.

**Table 2.** Variance inflation factor

Variables	VIF	I/VIF
VACA	7.93	0.54
VAHU	6.49	0.62
STVA	1.06	0.88
AD	1.55	0.85
LEV	4.12	0.77
SIZE	4.63	0.72
Mean VIF	4.29	

Source: Authors' computation, 2019.

Table 2 displays that both VIF and its inverse suggest the non-presence of strong correlation among the explanatory variables of the study since none of the variable VIF is greater than 10%. Gujarati (2009) asserts that the more the value of tolerance level inclines toward zero, the higher the level of multicollinearity. This is not the case of the result as the variables are over half of 100%, that is they tend towards 1.

**Table 3.** Model estimation selection

Test	Chi-square	P-values
BP-LM	0.00	1.0000
Rejection of $H_0$		
↓		
Proceed to Hausman		
Hausman	1.85	0.7632
Acceptance of $H_0$		
A random-effects estimate is selected		

Source: Authors' computation, 2019.

According to Table 3, the BP-LM test for random-effects produced a chi-square of 0.00 and a p-value of 1.0000. This led to the rejection of the hypothesis that states that random-effects variance is zero. This means that pooled OLS is not suitable for the study's model.

As for the Hausman test, a chi-square of 1.85 and a p-value of 0.7632 were derived which resulted in the strong acceptance of the null hypothesis. The implication is that superior and reliable estimates will be produced by the random effect model compared to the fixed effect model.

As a result of the above findings, only estimates of the random-effects model were explained to describe the effect of intellectual capital efficiency on the market-based financial performance of listed conglomerate companies in Nigeria.

**Table 4.** Estimates of a random-effects model

Variables	Random-effects
Constant	0.0000944 (0.336)
VACA	14.48 (0.004)*
VAHU	8.48 (0.022)**
STVA	3.99 (0.060)***
AD	1.86 (0.449)
LEV	7.83 (0.040)**
SIZE	-11.44 (0.034)**
<b>Model statistics</b>	
R <sup>2</sup> (within)	0.1902
Ward stat.	13.54 (0.034)**

Notes: \*, \*\*, and \*\*\* denote statistical significance at 1%, 5%, and 10%, correspondingly. Similarly, the p-values are stated in parentheses.

Table 4 indicates the linear connection between intellectual capital efficiency and market-based financial performance of listed conglomerate companies in Nigeria, by employing panel regression analysis. The table displays the outcome of the random-effects regression analysis.

From the result, it can be observed that the value-added efficiency of capital employed, value-added efficiency of human capital, advertising expenses and leverage are all in line with the *a priori* expectancy with a positive sign for value-added efficiency of capital employed, value-added efficiency of human capital, advertising expenses, and leverage, while value-added efficiency of structural capital and size does not concur with *a priori* expectation.

This implies that there is a direct relationship between value-added efficiency of capital employed, value-added efficiency of human capital, value-added efficiency of structural capital, advertising expenses, leverage, and market-based financial performance of quoted conglomerates companies in Nigeria while there is an inverse connection between size and market-based financial performance of quoted conglomerates companies in Nigeria.

From the perspective of the magnitude of the coefficient, five variables: value-added efficiency of capital employed, value-added efficiency of human capital, value-added efficiency of structural capital, leverage, and size have substantial effect as regards intellectual capital disclosure of listed Nigerian conglomerate companies as indicated by a coefficient (14.48, 8.48, 3.99, 7.83, and -11.44) with probability values (0.004, 0.022, 0.060, 0.040, and 0.034) at 1%, 5%, 10%, 5%, and 5% significance level in that order.

The result implies that a unit increase (decrease) in value-added efficiency of capital employed will bring about a 14.48% increase (decrease) in the market-based financial performance of listed conglomerate firms.

Also, if there is a unit growth (decline) in the value-added efficiency of human capital, there will be an 8.48% rise (reduction) in the market base performance of quoted conglomerate firms.

Similarly, if there is a one-unit rise (fall) in the value-added efficiency of structural capital, it will attract a 3.99% increase (decrease) in market-based performance.

This study also reveals that when there is a rise (decline) in the debt to equity, it will prompt a 7.83% increase (decrease) in market-based financial performance. Finally, a 1% drop (upturn) in size will bring 0.11% rise (fall) in market-based performance.

However, advertisement expenses lack substantial influence on market-based financial performance as indicated by a coefficient (1.86) with a probability value (0.449) at a 10% level of significance.

**Table 5.** Robustness check using ROA as a dependent variable

Variable	Pooled OLS
Constant	0.0037329(0.504)
VACA	-0.298 (0.043)**
VAHU	0.018 (0.001)*
STVA	0.021(0.468)
AD	0.116 (0.086)***
LEVERAGE	-0.115(0.982)
SIZE	0.069(0.685)
Model statistics	
R <sup>2</sup> (within)	0.587
F-stat.	4.978(0.003)*
BP-LM	0.00(0.042)**

Notes: \*, \*\*, and \*\*\* denote statistical significance at 1%, 5%, and 10%, correspondingly. Similarly, the p-values are stated in parentheses.

To test for the robustness of this study, the dependent variable (market-based performance) was replaced with a measure of financial performance (ROA). Table 5 reveals the result of the robustness test as the association between ROA and other independent variables is depicted with the aid of the linear regression technique.

From the result, it can be observed that intellectual capital variables depict a positive association with financial performance except for the value-added efficiency of capital employed and leverage.

This negative association was not consistent with the association arrived at when a book-to-market value was used as a proxy for performance.

Considering the magnitude of the coefficient, a smaller value was derived from the coefficient when ROA was used as a proxy for performance. Table 5 shows that the value-added efficiency of structural capital, leverage, and size has no significant relationship with intellectual capital. This is revealed by their probability values which are not significant at 10%.

However, the value-added efficiency of capital employed, the value-added efficiency of human capital, and advertisement expenses reveal substantial influence on performance as indicated by coefficients with probability values and are robust to changes in the proxy of the dependent variables (performance).

## 5. DISCUSSION OF RESULTS

### 5.1. First null hypothesis

Value-added efficiency of capital employed does not have a significant effect on the market-based financial performance of Nigerian quoted conglomerate companies, as the first null hypothesis stated. It was revealed, at a 1% level of significance, that the value-added efficiency of capital employed has

a significant impact on the market-based financial performance. Consequently, the null hypothesis is deflated. The outcome of this analysis is similar to that of Zeghal and Maaloul (2010), Alipour (2012), Chen et al. (2005), who suggest that the value-added efficiency of capital employed gives a significant impression on the market-based financial performance.

### 5.2. Second null hypothesis

The second null hypothesis states that the value-added efficiency of human capital does not have a significant influence on the market-based financial performance of quoted Nigerian conglomerate companies. At a 5% level of significance, it was discovered that the value of human capital does have a significant influence on market-based financial performance. Thus, the null hypothesis was rejected. This study is in accord with the findings of Maditinos et al. (2011), Maria Díez et al. (2010), Muhammad and Ismail (2009), and Cabrita and Bontis (2008), who opined that the value-added efficiency of human capital has a noteworthy and direct association with the market-based financial performance which complies with signaling theory that the party in possession of vital information should share with the other party so that asymmetric information can be reduced.

### 5.3. Third null hypothesis

The third null hypothesis was that the value-added efficiency of structural capital does not have a significant effect on the market-based financial performance of quoted conglomerate companies in Nigeria. At a 10% level of significance, this study found the value-added efficiency of structural capital with a significant impact on market-based financial performance. Hence, the null hypothesis is shunned. This finding fails to be in line with that of Kamath (2015) and Salman et al. (2012) but supports the finding of Berzkalne and Zelgalve (2014) who suggest that the value-added efficiency of structural capital do possess a significant impact on market-based financial performance.

### 5.4. Fourth null hypothesis

The fourth null hypothesis was that advertisement expenses do not have a significant impact on the market-based financial performance of quoted Nigerian conglomerate companies. At exactly a 10% level of significance, it was revealed that advertisement expenses possess no significant impact on market base performance. As a result, the null hypothesis is accepted. This finding correlates with that of Zeghal and Maaloul (2010), Alipour (2012), and Chen et al. (2005), who suggest advertisement expenses has no significant impact on the market-based financial performance.

## 6. CONCLUSION

IC is acknowledged as a crucial company asset proficient in generating a persistent competitive edge and more market-based financial performance (Weqar, Khan, Raushan, & Haque, 2021).



The results of the study highlighted the consequence of intellectual capital disclosure efficiency on the market-based financial performance of listed Nigerian conglomerate companies. Based on the findings, it was concluded that market-based financial performance is influenced by the disclosure of intellectual capital of quoted Nigerian conglomerate companies. This means that ups and downs in market-based financial performance are influenced by variations in intellectual capital components disclosure of companies quoted on the Nigeria conglomerate sector.

Based on the findings of the study, it is suggested that for companies to make good and informed decisions, information that has to do with components of intellectual capital should be reported in ways they deem fit which could be qualitative or quantitative by developing a model of intellectual capital disclosure that complies with the International Accounting Standard Board (IASB) for financial reporting for use by both internal and

external stakeholders. Additionally, conglomerate firms in Nigeria should invest more in intellectual capital to ameliorate the worth of their firms in the stock exchange market.

The foremost constraint of this study is the small population, i.e., the quoted conglomerate firms in Nigeria are just six. Another limitation of the study was the investigation of both explained and explanatory variables with just one intellectual capital disclosure measurement model.

Future research could investigate the impact of intellectual capital efficiency on the financial performance of companies in the financial services industry. Also, a comparative investigation could be carried out on the financial performance of companies in the non-financial services and financial services sectors. Finally, comparative analysis considering performance as a whole could also be carried out among heterogeneous economic thriving companies in Africa as well as other continents of the world.

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