ASEAN Entrepreneurship Journal (AEJ)

Intellectual Capital Efficiency on Corporate Value Creations: Evidence from Quoted Industrial and Consumer Goods Manufacturing Firms in Nigeria

Peter Chinedu Okoye[1]*, Fadzlina Mohd Fahmi[2] and Mazurina Mohd Ali[3]
1 Faculty of Accountancy, Universiti Technologi Mara (UiTM), Shah Alam, Malaysia, 2023766187@students.uitm.edu.my
2 Faculty of Accountancy, Universiti Technologi Mara (UiTM), Shah Alam, Malaysia, fadzli686@uitm.edu.my
3 Faculty of Accountancy, Universiti Technologi Mara (UiTM), Shah Alam, Malaysia, mazurina@uitm.edu.my

* Corresponding Author

Abstract
This study empirically examined the effect of intellectual capital efficiency on the corporate value created by listed Nigerian industrial and consumer goods manufacturing firms. A correlational longitudinal panel research design was employed by the study. Intellectual capital efficiency was proxied by structural capital efficiency, human capital efficiency, and capital employed efficiency. While corporate value creation was proxied by the market to book value of the firm. Twenty-six (26) of the thirty-four (34) quoted industrial and consumer goods manufacturing companies were selected by means of a purposive sample technique. A panel data regression technique was used to analyse the data taken from the sampled companies' annual reports between the period 2013 to 2022. The results found that structural capital, human capital efficiency, capital employed efficiency and firm size have positive insignificant effect on the market to book value of the sampled firms. Thus, indicates that intellectual capital efficiency has no significant relationship with corporate value of quoted industrial and consumers goods manufacturing companies in Nigeria. The study findings guide corporate managers not to ignore investment in intellectual capital as it may equally have positive effect in order areas in the firm which could in turn affect cost reduction, sales, profitability, and eventually create long-term corporate value. Such areas include customer satisfaction, corporate image, unique skills, process improvement, waste control and competitive advantage. The study unveils the likely significance of intellectual capital management strategies, encompassing practices, policies, and methodologies, on the corporate value created by listed businesses operating in Nigeria's industrial and consumer goods manufacturing sectors.

Keywords: structural capital efficiency, human capital efficiency, capital employed efficiency, corporate value creation.

ARTICLE INFORMATION

Received: 29 Jul 2024
Revised: 29 Aug 2024
Accepted: 05 Sep 2024
Published: 18 Oct 2024

INTRODUCTION

Investment in employees' development in recent times is commanding attention from corporate entities and intellectual capital, just as direct investments on purely tangible assets is now a key consideration in decision making at strategic level. This is because according to Haris et al. (2019), investment in Intellectual capital can be seen as a resource that allows sustainable acquisition of wealth. The globalization move has spur corporate entities to transform form the physical labour intensive-based industry to one based on skills and knowledge, and as such enterprises are focused on nurturing their intangible assets to achieve competitive advantage and create sustainable corporate value (Gupta et al., 2020).

The influence of fixed assets and financial assets on businesses' operations are becoming continually displaced by intangible resources and assets (Gogan et al., 2016). Intellectual capital, which are intangible resources relating to staff knowledge and competence, client trust, and the effectiveness of corporate operations, is typically used to describe direct investment in the growth and development of personnel in the firm. The effectiveness and competitiveness of organisation is now beyond machines and tools as primary drivers, but harnessing the intelligence of brains is a key

driver (Horibe, 2015; Alvino et al., 2021). As such, the management of corporate entities must understand that their actions and decisions may have a considerable impact on how efficiently intellectual capital is utilised in the firm.

The intellectual capital efficiency of an organisation can increase investor confidence, thus positively impacting increasing corporate value created. Khan & Sukarno (2024) postulated that a firm's worth or value is a condition that it has attained as an expression of the public's trust in the firm after undergoing a series of processes spanning from its inception to the present. Della Corte et al. (2021) argued that the extent of the stock market's response to the corporation is reflected in the corporate value, which is also the shareholder value. The increase in the public's estimation of the stock market price over the business's book worth is reflected in the higher corporate value.

The nature of the firm's intangible assets is somewhat reported by intellectual capital efficiency. Efficiency in intellectual capital is also helpful in closing the knowledge gap that exists between the company's owners and managers (Artinah, 2013). Financial market participants and investors typically rely on financial information when making decisions, therefore it is relevant if it may validate or contradict investors' assumptions regarding the company's value (Ibikunle et al., 2013).

Previous researchers have investigated intellectual capital in a couple of studies. Ahmed & Hussin (2024), for example, analysed non-financial firms in 11 Malaysian industries and found that intellectual capital efficiency significantly improved performance. Similarly, Bhattacharjee & Akter (2022) discovered that the financial performance of listed companies quoted on the Bangladesh Capital Market is positively impacted by intellectual capital. Nguyen & Doan (2020) examined the relationship between intellectual capital and corporate value in Vietnam from 2013 to 2018 and found that value-added intellectual capital positively impacted firm's profitability in a significant manner. However, different findings were obtained Ida et al. (2018), who looked at the impact of intellectual capital and intellectual capital disclosure on corporate value and came to various conclusions. Their study found that while intellectual capital disclosure and corporate financial performance have a positive impact on company value, intellectual capital itself does not affect corporate value. In a similar vein, Shubita (2019) investigated corporate value and intellectual capital, sampling Seventy-three Jordanian manufacturing businesses with shareholders between 2005 and 2017. The study findings demonstrated no correlation between corporate value and intellectual capital. While corporate value and human capital were related, corporate value was not related to social capital and capital employed efficiency.

These inconsistent findings of prior research which has been empirically explored by the researchers served as the impetus for this study. The aim for the study is to empirically investigate the effect of Intellectual Capital Efficiency (structural capital efficiency, human capital efficiency and capital employed efficiency) and firm size on the corporate value created by listed industrial and consumer goods manufacturing firms in Nigeria.

The failure of Nigerian firms to properly harness intellectual asset as a key determinant of growth and manage it efficiently has made many of the country’s unskilled labour with intellectual capacity move to other countries of the world with better intellectual capital advantages (Ewereoke, 2018). Such trend, if persistent could lead to loss of the country’s active workforce and cause brain drain in the economy. A company's inability to efficiently deploy intellectual capital can lead to a decrease in the company's financial position and lose the long-term competitive advantage (Bruggen et al., 2009). Consequently, comprehensive research is now required due to the growing interest in market capitalisation and intellectual capital efficiency in both developed and developing nations. Results from this study is needed to support grasp of knowledge and decision making in the academic community and Nigerian business environment. This is also against the backdrop that, despite the utilization of equipment and machinery, the Nigerian industrial and consumer goods sector is still predominantly labor-intensive, where human resources are crucial. Findings from research on these sectors could throw illumination on its possible advantages to be considered for recent change in corporate strategy, re-examining the relationship between intellectual capital and corporate value.

In light of the above, the primary objective of this study focused on empirically determining the effect of intellectual capital efficiency on the created corporate value of quoted Nigerian industrial and consumer goods manufacturing firms. Three research questions targeted toward achieving the study objective were posed as follows:

i. What effect does structural capital efficiency have on the corporate value of quoted Nigerian companies that manufacture industrial and consumer goods?

ii. How does human capital efficiency affect the created corporate value of quoted Nigerian companies that produce industrial and consumer goods?

iii. What impact does capital employed efficiency have on the corporate value created by quoted Nigerian companies that manufacture industrial and consumer goods?

This paper has been structured into five sections; the first provides the research background, and the second reviews the relevant literatures and formulates hypotheses. The research methodology is captured in the third section, while the discussion of results and findings is made in the fourth section. Section five covers the conclusion reached and recommendations made by the study.

LITERATURE REVIEW

Foundational Theory

The Knowledge-based theory is amongst the widely accepted theories that have been associated with intellectual capital and corporate value. The Knowledge-based theory was developed by Stalk in 1992 and makes the assumption that every firm's competitive capacity is based on capabilities and competences that are knowledge-driven. According to Kengatharan (2019), organisational capabilities are founded on knowledge, and as knowledge is a resource that serves as the basis for business capabilities, an organisation's possession of peculiar knowledge gives it access to particular capabilities. Moreso, Surdarsanam et al. in Adegbayibi (2021) pointed out that having sound knowledge enables particular capabilities, therefore only managing knowledge will assist an organisation identify, preserve, and update its competencies over the course of both the short- and long-term. The knowledge that firms acquire constitutes their intellectual resources, and organisations can improve their corporate value or worth through knowledge by efficiently ustilising their human capital, structural capital, and capital employed in its operations.

Intellectual Capital (IC)

The term "intellectual capital" according to Bontis et al. (2018) has been used to refer to the assets that employees of businesses possess, including their knowledge, abilities, skills, and experiences that help the business succeed, gain a competitive advantage and create corporate value. Gogan & Doran (2014) postulated that intellectual capital refers to ongoing abilities and knowledge held by employees that are exclusive to their organisation and strengthen its competitive advantage. Given that terminology like "intellectual capital" are used interchangeably to refer to intangible assets that may be useful in the future, Kavida & Sivakouar (2009) pointed out that there is no universally accepted definition for this concept. However, Karabay (2011) and Sardo et al. (2018) believes the value and relevance of intellectual assets increases with an individual's capacity, competencies, creative and inventive talents, to create corporate value for all stakeholders.

Intelligent resources are the foundation of intellectual capital, which is a valuable asset. According to Pramestiningrum (2013), intellectual capital is an intangible asset that influences managerial choices and impacts business outcomes. Kristandl & Bontis (2007), grouped intellectual capital of a firm into three categories: relational, structural, and human capital. However, relational, structural, and human capital are not sufficient to create value for the company on their own; rather, they could be combined with other forms of intellectual capital that the organisation owns and uses, such as financial and physical capital, which is sometimes designated as capital employed.

Human Capital Efficiency: Human capital describes the intangible resources that a company has in the form of its employees' creativity, intellectual prowess, and inventiveness (Abd-Elrahma & Hassan, 2020). Human capital efficiency is a measure of how well the business uses its staff's aggregate knowledge to provide the optimum solution. It is the ability of a company to pool its human capital to get the best solutions from its knowledge base. Human capital efficiency is critical because it is a spring of strategic rejuvenation and innovation, whether it comes from research lab thinking, office daydreaming, file purging, process reengineering, producing new sales leads, or enhancing personal abilities.

Structural Capital Efficiency: According to Wang et al. (2018), structural capital efficiency refers to an organisation's or company's capacity to carry out regular business operations and maintain a framework that encourages employee endeavours to generate the best possible intellectual output and overall business performance. The company's operational system, management philosophy, production process, organisational culture, and all forms of intellectual property are a few examples of these frameworks. Even if a person may possess a high degree of intelligence, inadequate methods and procedures inside an organisation will prevent intellectual capital from reaching its full potential. The structural capital efficiency has to do with the practices and frameworks of the company that help workers in their pursuit of the highest level of intellectual performance and, consequently, total business value and performance.

Capital Employed Efficiency: The economic term capital employed efficiency describes how well an organisation uses its capital for production and other company operations in order to maximize value at the lowest possible cost (Nguyen & Doan, 2020). This ratio shows how much money is spent on capital to create value for the business. Businesses should look for ways to fully utilise both internal and external resources to meet their goal of enterprise value. Thus, the effectiveness of how businesses use their money must be prioritized. Capital Employed Efficiency is an assessment of value added produced by the physical capital of the business (Sowaity, 2022). Thus, demonstrating the positive working relationships the corporate entity has with its dependable suppliers, devoted clients who are pleased with the business's services, and the firm’s local community of business operations.

Measurement of Intellectual Capital

The value-added intellectual coefficient (VAIC) is a well-known measure of intellectual capital proposed by Pulic (2008). It is an objective and dependable measure which is in congruent with the knowledge-based economy. VAIC is a tool used to quantify business performance and offer more specific details on the state of a company with the intention to assist managers in realizing the potential of their organisations (Pulic, 2000). VAIC is concerned with the efficiency of three types of capital: structural capital (SC), which is the difference between the value added generated by the firm and human capital; physical and financial capital employed (CE), which is the amount of financial capital available to the firm; and human capital (HC), which is determined by the cost of employees.

An increase in the VAIC indicates that a company is becoming more efficient with its resources overall and with the knowledge of its personnel specifically, which enhances the company's capacity to generate new economic value (Pulic, 2004). Because of the VAIC model's ease of use and the suggested correlations between it and company value, there has been a surge in interest in the VAIC. However, the VAIC has come under fire from two different angles: first, some academics have pointed out theoretical errors in the model, while others have published surprising findings from studies examining the relationship between the VAIC and corporate value.

Corporate Value Creation

Corporate value is the worth of a company's shares dealt in the stock market during the interaction of supply and demand forces, which are influenced by the surrounding sustainability factors, according to Kapoor et al. (2009) and Della Corte et al. (2021). The market performance of the company or the price of the company's stock are often associated with the firm's perceived corporate value by shareholders and investors. According to Nuryaman (2012), corporate value is an assessment of a firm's results that considers both the company's risks and investment returns. A high corporate value will enable the business to operate sustainably by providing a return to stakeholders and increasing their investment value. Because the market or corporate value is a crucial factor in influencing decisions made by both

current and potential investors and the most accurate measure of a company's performance, it can be used as a tool by the firm to draw in more capital inflows and investors. It also aids in management planning and helps the business reach the ideal level of market competition, which raises share prices and increases profits (Ali, 2018).

Development of Hypothesis

The relationship between intellectual capital efficiency and corporate value created by a firm can be appreciated when viewed through the perspective of the Knowledge-based theory. An organisational capability according to Marr et al. (2004), is founded on knowledge, and knowledge is a resource that serves as the basis for business capabilities. To maximize the corporate value of the business and highlight its prospects, the company needs to be able to manage its resources competently. Effective handling of a company's intellectual resources and assets can raise its corporate value and investor's perception. A capitalist's assessment of the company's worth is called firm or corporate value, and it is typically associated with the price of the shares (Rodoni & Ali, 2014). It is also a metric that investors employ as a structured guide for arriving at funding decisions in order to obtain a competitive edge (Cahyadi, 2012). Superior intellectual capital will be created in the company if the three intellectual resources available to independent contractors; money, human capital, and structural capital, can be used to their fullest potential. The company will be able to better serve the interests of investors and other stakeholders with the help of intellectual capital.

An increasing demand for a company's stocks will demonstrate to investors in the capital market their appreciation for the excellence of their intellectual capital, which could influence the firm's value increase. A variety of previous studies have demonstrated the positive impact of intellectual capital on firm value as determined by the share price. Specifically, value added intellectual capital (VAIC) has been shown to positively correlate with the firm's market to book value (Poraghajan, 2013) and to promote a higher price to earnings ratio (Femianti & Anantadjaya, 2014). Considering of the above, the study has formulated a null form hypothesis to examine the relation between intellectual capital and corporate value and further broken down into the components of IC in order to properly address the research questions as shown below:

Ho: Intellectual capital efficiency has no significant impact on the corporate value of quoted Nigerian companies that manufacture industrial and consumer goods.

Ho1: Structural capital efficiency has no significant impact on the corporate value.

Ho2: Human capital efficiency has no significant effect on corporate value.

Ho3: Capital employed efficiency has no significant impact on the corporate value.

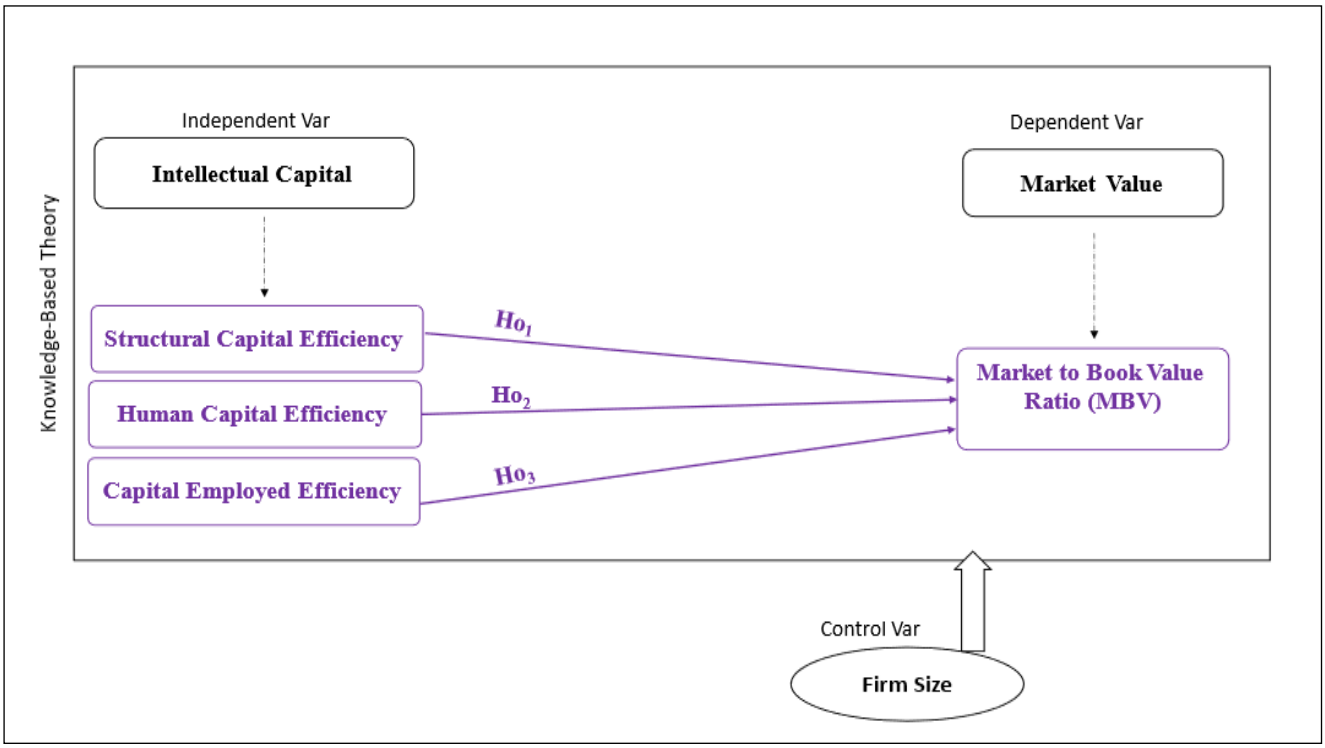

Figure 1: Theoretical Framework

METHODOLOGY

Research Design and Data Collection

The correlational longitudinal panel research design was employed in this study to collect data on the current state of the research study and to illustrate and characterise the dynamics of the relationship between the study variables over a lengthy period of 10 years. This design of study is correlational and cross-sectional as it's geared towards explaining the effect and level association of the independent variable on the dependent variable across a couple of firms.

The research explored the use of secondary sources of data to gather relevant, sufficient, and reliable data which are needed to fulfil study objectives. The published annual financial reports served as a secondary source of data collecting and stock market published information on share prices of the sampled firms quoted on the Nigerian Exchange Group between the period of 2013-2022 were equally obtained. The relevant data for the dependent, independent, and control variables represented several types of ratios were collected from the published financial reports.

Population and Sample Size

All the quoted industrial and consumer products manufacturing firms on the Nigeria Exchange Group formed the population of study. Employing the purposeful sampling methodology, the study criterion for sample selection used was that; a firm must be listed before the year 2013 and remain in operation and continued quoted during the 10-year period of the study (2013 to 2022). As a result of the above criterion, twenty-six (26) out of the thirty-four (34) quoted firms were selected to form the sample size of the study. The sample size of twenty-six (26) is made up of ten (10) Industrial goods firms and sixteen (16) consumer goods firms.

Variables

The Independent variable of this study is intellectual capital, which is proxied by structural capital efficiency, human capital efficiency, and capital employed efficiency. While the dependent variable is corporate value created is proxied

by the market to book value of the firm. Intellectual capital efficiency was measured using the VAIC Model. The researcher started with the first measurement of calculating the Value Added (VA) using the formula (Pulic, 2004) as follows:

Value Added (VA) = Output – Input

Capital Employed Efficiency (CEE) = Value Added / Capital Employed

Human Capital Efficiency (HCE) = Value Added / Human Capital

Structural Capital Efficiency (SCE)= Structural Capital / Value Added

VAIC = CEE + HCE + SCE

The above formulae were also adopted in studies conducted by, Adegbayibi (2021), Shubita (2019) and Ida et al. (2018)

Information Note:

Output: Total revenue and other sales

Input: Expenses and expenses except for employee expenses.

Capital Employed: Equity or Net assets of the firm.

Human Capital: Employee expenses

Structural Capital: Value Added – Human Capital

Table 1: Description of Variables

Variable Name	Type	Measurement	Source
Market to Book Value (MBV)	Dependent Var	*Market Value divided by Equity Book Value of Firm.*	(Hall, 2024)
Structural Capital Efficiency (SCE)	Independent Var	*Structural Capital divided by Value Added.*	(Adegbayibi, 2021; Shubita, 2019)
Human Capital Efficiency (HCE)	Independent Var	*Value Added divided by Human Capital.*	(Adegbayibi, 2021; Shubita, 2019)
Capital Employed Efficiency (CEE)	Independent Var	*Value Added divided by Capital Employed.*	(Adegbayibi, 2021; Shubita, 2019)
Firm Size (FS)	Control Var	*Natural logarithm of Total Assets.*	(Adegbayibi, 2021)

Model Specification

This study employed the instrumentality of regression analysis and the data required consisted of annual observations between 2013 and 2022. The cross-sectional data was used to estimate longitudinal panel data over a 10-year period. Statistical software Gretl version 3.0 was used to examine the secondary data that was gathered for the dependent and independent variables using descriptive statistics, inferential statistics, correlation analysis, panel regression, and post regression diagnostic test on variables.

A modified version of the panel data regression analysis model $\mathbf{Y_{it} = a+b_{it}+e_{it}}$ was used to investigate the connection between intellectual capital efficiency and market value. The regression model for the empirical analysis of this study is as follows:

Ho: $MBV_{it} = a + b_1(SCE_{it}) + b_2(HCE_{it}) + b_3(CEE_{it}) + b_4(FS_{it}) + e_{it}$ ……. (1)

Ho_1: $MBV_{it} = a + b_1(SCE_{it}) + b_4(FS_{it}) + e_{it}$

Ho_2: $MBV_{it} = a + b_2(HCE_{it}) + b_4(FS_{it}) + e_{it}$

Ho_3: $MBV_{it} = a + b_3(CEE_{it}) + b_4(FS_{it}) + e_{it}$

Where;

MBV_{it} = Market to Book Value Ratio

SCE_{it} = Structural Capital Efficiency

HCE_{it} = Human Capital Efficiency

CEE_{it} = Capital Employed Efficiency

FS_{it} = Firm Size

a= Constant, *b*= Coefficient, *i*=Number of firms,

t= Time period, *e* = error terms.

RESULTS & DISCUSSIONS

A) Descriptive analysis

Table 2 presents descriptive statistics for 26 sampled listed manufacturing companies capturing the five core variables of the study. The mean, medium, minimum, maximum, standard deviation, coefficient of variation, skewness, kurtosis, and Jarque-Bera were all calculated using descriptive statistics.

Table 2: Summary Statistics for all the variables

	MBV	**SCE**	**HCE**	**CEE**	**FS**
Mean	3.984	1.405	2.176	0.2949	17.236
Median	1.386	0.541	1.763	0.2369	17.375
Minimum	-3.303	-10.96	-16.29	-1.655	12.064
Maximum	77.71	141.4	15.47	3.106	21.701
Standard D.	8.394	9.083	3.416	0.384	2.174
Coef. of V.	2.107	6.467	1.570	1.3038	0.1261
Skewness	4.961	14.27	-0.824	2.7867	-0.070
Ex. Kurtosis	31.39	215.95	11.245	18.582	-1.016
Jarque-Bera test	0.000	0.000	1.4e-30	0.000	0.003
Observation	260	260	260	260	260

Source: Gretl Output Results, 2023

As shown above, Market to Book Value (MBV) has a mean value of 3.984 and a median value of 1.386 with minimum and maximum values of -3.303 and 77.71 respectively. The standard deviation measuring the spread of the distribution stood at 8.394. Thus, shows that all the sampled companies do have values for MBV during the period under study. The mean value for Structural Capital Efficiency (SCE) is 1.405 and the median is 0.541 with a minimum and maximum values of -10.96 and 141.4 respectively. The standard deviation from both sides of the mean stood at 9.083 with a coefficient variance of 6.467 indicating a considerable dispersion around the mean.

The results above also showed that the average for Human Capital Efficiency (HCE) from the sampled companies is 2.176 with a standard deviation of 3.416 from the mean. The minimum value observed is -16.29, while the maximum value observed is 15.47, and a coefficient variance of 1.570 indicating a lower dispersion around the mean. Similarly, the computed mean and median for Capital Employed Efficiency (CEE) is 0.2949 and 0.2369 respectively. CEE showed a minimum and maximum values of -1.655 and 3.106 respectively with a lower standard deviation of 0.384 from both sides of the mean.

From Table 2 above, it can equally be observed that MBV and SCE are extremely positively skewed while CEE is slightly positively skewed. conversely, HCE is slightly negatively skewed, but within the acceptance range. FS showed a negative response of -0.070 which is close to zero. According to Hair et al., (2022), the response pattern is regarded as having a normal distribution when both skewness and kurtosis values are close to zero. The value skewness results for MBV, SCE, HCE and CEE indicate the presence of outliers in the data set. Similarly, MBV, SC, HCE and CEE showed extremely excess positive kurtosis (leptokurtic distribution), while FS showed an excess negative kurtosis (platykurtic distribution). This equally indicates the presence of outliers and heavy tails in the data set. The results for the Jarque Bera test from table 2 above showed that the distribution of MBV, SCE, HCE, CEE and FS were affected by the presence of outliers, as each variable showed a value less than 0.05. The presence of outliers was associated to genuine extreme observations in the dataset.

Correlation Analysis

The study used the Spearman's rank-order correlation given that the results from the Skewness, Kurtosis and Jarque-Bera test noted a non-normal distribution observed with the presence of outliers and heavy tails in the data set.

Table 3: Spearman's rank correlation coefficient, using the observations 1: 01 - 26:10
Under the null hypothesis of no correlation for all variables

MBV	**SCE**	**HCE**	**CEE**	**FS**	
1.0000	0.1897	0.2115	0.4047	0.2136	**MBV**
	1.0000	0.4412	0.0319	0.0655	**SCE**
		1.0000	0.5360	0.3108	**HCE**
			1.0000	-0.0057	**CEE**
				1.0000	**FS**

Source: Gretl Output Results, 2023

The above table shows the results of the correlation analysis, from which it was observed that all the independent variables had a positive association with the dependent variable and there was no relationship among the dependent and independent variables that was greater than 0.70 to pose the problem of singularity of data. Consequently, the extent of relationship among all the independent variables is minimal and negligible.

Table 3 showed that MBV is positively correlated to SCE, HCE, CEE and FS with coefficients of 0.1897, 0.2115, 0.4047 and 0.2136 respectively. However, this relationship between the dependent and the independent variables appears

to be a very weak correlation, except for CEE which showed a positive linear relation of 0.4047. Thus, an increase in intellectual capital efficiency will only lead to a minimal or no increase on the corporate value of the selected listed industrial and consumer goods firms quoted on the Nigerian Exchange Group.

Regression Analysis

A pooled OLS regression was conducted based on the dataset. This was followed by a White's test for heteroskedasticity.

Table 4: White's test for Heteroskedasticity

Test statistic: TR^2 = 16.356143,
with p-value = P(Chi-square (14) > 16.356143) = 0.292112

The result of the test as shown in table 4 above showed that there was no problem of Heteroskedasticity in model one as the probability chi-square value of 0.292112 is greater than 0.05. Having determined that heteroskedasticity was not an issue, that is the variation in the error term is constant across all levels of the independent variables, the study recognised that there was no need to conduct a robust regression with standard errors on the final model chosen from the Breusch-Pagan and Hausman tests.

Test for Pool OLS, Fixed Effect and Random Effect.

A panel regression with robust standard errors excluded was conducted for both fixed effect and random effect, considering the findings of the White's test for heteroskedasticity. To ascertain either random effect regression or pooling OLS is more suitable, the Breusch Pagan test for random effects was also performed. The results in table 5 below showed a chi-square of 85.6165 with a corresponding with a p-value of 2.184e-20. Thus, rejected the null hypothesis that OLS model is appropriate (variance is constant) and accepted the alternative hypothesis that random effect regression is most appropriate model.

However, the Hausman specification test was performed to determine whether the fixed effect or the random effect regression model was the better fit for the study. The result of the test as shown in table 5 below illustrated a chi-square value of 18.1188 with probability value of 0.001170 respectively, and therefore rejected the null hypothesis that random effect regression model is more appropriate and accepted the alternat hypothesis that fixed effect regression model is preferred for the sampled data.

Table 5: Hausman test and Breusch-Pagan test.

	Chi-bar2	**Prob>chi2**
Hausman test	18.1188	0.00117
Breusch-Pagan test	85.6165	2.184e-20

Considering the above, the study adopted the fixed effect regression model in testing the hypothesis of the sampled dataset.

Test of Hypotheses and Discussion of Findings

The study sought to empirically determine the effect of intellectual capital efficiency via its components of structural capital efficiency, human capital efficiency and capital employed efficiency, on corporate value created by quoted industrial and consumer goods manufacturing firms in Nigeria.

The study had earlier identified relevant hypothesis to guide the answering of the research questions posed and facilitate achievement of the study objective. The fixed effect regression model that was deployed excluded the robust standard errors as there the data set did not have a heteroskedasticity problem. The model tested each of the formulated hypotheses as shown below in table 6 below and the subsequent discussions and analyses.

Table 6: Fixed effect Regression Model Result

Model 2: Fixed effects, using 260 observations.
Included 26 cross-sectional units.
Time-series length = 10
Dependent variable: MBV

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
Const	1.31684	15.9843	0.08238	0.9344
SCE	0.00640759	0.0449667	0.1425	0.8868
HCE	0.134884	0.211883	0.6366	0.5250
CEE	1.44120	1.53549	0.9386	0.3489
FS	0.112556	0.920989	0.1222	0.9028

Mean dependent var	3.984425	S.D. dependent var	8.393712
Sum squared resid	8972.321	S.E. of regression	6.245806
LSDV R-squared	0.508304	Within R-squared	0.009437
LSDV F(29, 230)	8.198911	P-value(F)	2.76e-22
Log-likelihood	−829.2824	Akaike criterion	1718.565
Schwarz criterion	1825.385	Hannan-Quinn	1761.508

Joint test on named regressors -
Test statistic: F(4, 230) = 0.547804
with p-value = P(F(4, 230) > 0.547804) = 0.700806
Test for differing group intercepts -
Null hypothesis: The groups have a common intercept.
Test statistic: F(25, 230) = 6.30587
with p-value = P(F(25, 230) > 6.30587) = 2.11783e-15

Source: Gretl Output Results, 2023

Ho: Intellectual capital efficiency has no significant impact on the corporate value of Nigerian companies that manufacture industrial and consumer goods.

The results from the fixed effect regression conducted in Table 6 above showed that the F- statistics value of 8.1989 and a corresponding significant P-value(F) of 2.76e-22 which is less than 0.05 indicated that the model is fit to explain the relationship expressed in the study. The results also showed a coefficient of determination as presented by the R-square of 0.009437 from the 260 observations deployed in the study. This is an indication that only approximately 1% of the movement in the dependent variable (market value) can be jointly explained by changes in the independent variables (structural capital efficiency, human capital efficiency and capital employed efficiency). This was also supported by the Joint test on named regressors which showed a test statistic of 0.547804 with an insignificant p-value of 0.700806. The result connotes that, a 1% increase in investments on intellectual capital activities such as staff training, skill acquisition, business research, process improvement, unique production techniques, etc. will lead to only a corresponding 1% increase in the corporate value of these manufacturing firms. This effect can be said to be insignificant and consistent with the studies carried out by Ida et al. (2018) and Putra & Ratnadi (2021) on the effect of intellectual capital on firm value and found that intellectual capital has no significant impact on firm value.

Ho_1: Structural capital efficiency has no significant impact on the corporate value of Nigerian companies that manufacture industrial and consumer goods.

The fixed effect regression conducted for the dependent variable of MBV, showed the results for SCE as captured in table 6 above as follows: Coefficient = 0.00641, t-ratio = 0.1425 and p-value = 0.8868. This is an indication that structural capital efficiency has a positive effect on market value, but it is insignificant at 5% level given its p-value of 0.8868 with a coefficient of 0.00641. Thus, accepted the Null hypothesis that structural capital efficiency has no significant impact on the corporate value and rejected the alternate hypothesis. This result is supported by the study of Shubita (2019), which found structural capital not associated with corporate value for listed firms in Jordan. However, the result differs from Ali (2018) which found that structural capital has a significant effect to the market price of shares in Jordanian industrial companies.

Ho_2: Human capital efficiency has no significant effect on the market value of listed Nigerian companies that produce industrial and consumer goods.

The fixed effect regression conducted for the dependent variable of MBV, showed the results for HCE as captured in table 6 above as follows: Coefficient = 0.13488, t-ratio = 0.6366 and p-value = 0.5250. This is an indication that human capital efficiency has a positive effect on market value, which is insignificant at 5% level given its p value of 0.13488. with a coefficient of 0.5250. Thus, accepted the Null hypothesis that human capital efficiency has no significant impact on the corporate value and rejected the alternate hypothesis. This is because the relationship that exists between human capital efficiency and the created corporate value is positive but of little importance or negligible. This result differs from the study Adegbayibi (2021), which found that human capital efficiency had a significant effect on financial performance and firm value. However, the result is supported by Ida et al. (2018) which found that Intellectual capital has no significant effect to the market value for companies listed in Indonesian Stock Exchange.

Ho_3: Capital employed efficiency has no significant impact on the market value of Nigerian companies that manufacture industrial and consumer goods.

The fixed effect regression conducted for the dependent variable of MBV, showed the results for CEE as captured in table 6 above as follows: Coefficient = 1.44120, t-ratio = 0.9386, and p-value = 0.3489. This is an indication that human capital efficiency has a high positive effect on corporate value created, however it is insignificant at 5% level given its p value of 0.3489. with a coefficient of 1.44120. Thus, accepted the Null hypothesis that capital employed efficiency has no significant impact on the corporate value and rejected the alternate hypothesis. This is because there exists a

positive relationship between capital employed efficiency and the corporate value created, however this relationship is of little importance or negligible. This result differs from the study Ali (2018) which found that capital employed efficiency has a significant effect to the market price of shares in Jordanian industrial companies. However, the finding is supported the work of Shubita (2019), which found that capital employed efficiency has no significant influence on market value for listed firms in Jordan.

CONCLUSIONS AND RECOMMENDATION

The study found that only approximately 1% of the movement in the dependent variable (corporate value) could be jointly explained by changes in the independent variables (structural capital efficiency, human capital efficiency and capital employed efficiency). The study went further to reveal that structural capital has an insignificant positive effect on the market to book value. Thus, indicating that any increase in structural capital investments will not lead to an increase in the corporate value of the listed industrial and consumer goods manufacturing companies in Nigeria. Human capital efficiency, capital employed efficiency and firm size were also found to have an insignificant positive effect on the market to book value. That is, the relationship that exists between human capital efficiency capital employed efficiency, firm size and corporate value is positive but of little importance or negligible. Thus, any increase in these variables will not lead to an increase in the corporate value of the listed industrial and consumer goods manufacturing companies in Nigeria. The above findings, which could be of interest to various stakeholders' groups corroborated and differ with couple of previous studies in the different sectors and geographical locations.

Haven demonstrated a clear understanding of intellectual capital efficiency and its impact on corporate value, the study puts forward the following recommendations guided by issues drawn from the study findings:

1. The study recommended that managers of companies in the industrial and consumer goods sector in Nigeria should review their corporate strategy with respect to intellectual capital activities to ensure they harnessed best corporate value possible. That is spendings to promote intellectual capital activities should be targeted towards achieving other corporate objectives and not necessarily a direct increase in corporate value as perceived by investors.

2. Notwithstanding the insignificant effect of intellectual capital efficiency on corporate value, it is recommended that the listed industrial and consumers goods firms should nevertheless ignore investment in intellectual capital as it may have positive effect in other areas in the organisation which could in turn affect cost reduction, sales, profitability and eventually sustainable corporate value, such areas includes customer satisfaction, corporate image, unique skills, process improvement, waste control and competitive advantage.

Finally, a further empirical study can introduce a moderating variable such as financial structure risk to examine the potential role it will play in moderating the relationship between intellectual capital efficiency and corporate value creation.

Author Contributions: The collection of data and writing of the introduction, literature review, methodology and discussion was carried out by Peter Chinedu Okoye. The review and provision of needed feedback to properly guide and shape research was done by Fadzlina Mohd Fahmi and Mazurina Mohd Ali.

Conflicts of Interest: The authors declare no conflict of interest.

Funding: This research received no external funding.

References

Abd-Elrahman, A.-E.H., El-Borsaly, A.A.-E., Hafez, E.A.-E. & Hassan, S.A. (2020). Intellectual capital and service quality within the mobile telecommunications sector of Egypt. *Journal of Intellectual Capital, 21*(6), 1185-1208. https://doi.org/10.1108/JIC-07-2019-0180

Adegbayibi, A. T. (2021). Intellectual capital and firms' Performance measures of listed non-financial companies in Nigeria. *Journal of Accounting and Management*, *11*(2), 161-175.

Ahmed, Z. N. & Hussin, M. R. A (2024). The Effect of Intellectual Capital Efficiency on Malaysian Firm Performance: A Dynamic Panel Estimation. *Management And Accounting Review*, *23*(1), 57-84. https://doi.org/10.24191/MAR.V23i01-03

Alvino, F., Di Vaio, A., Hassan, R. & Palladino, R. (2021). Intellectual capital and sustainable development: a systematic literature review. *Journal of Intellectual Capital*, *22*(1), 76-94. https://doi.org/10.1108/JIC-11-2019-0259

Artinah, B. (2013). Factors that influence intellectual Capital disclosure in financial institutions listed on the Indonesian stock exchange. *Journal of the Social Sciences*, *5*(2), 235-242.

Bhattacharjee, S., & Akter, R. (2022). Intellectual capital efficiency and firm performance: Evidence from an emerging knowledge-economy. *International Journal of Learning and Intellectual Capital, 19*(1), 30-52. https://doi.org/10.1504/IJLIC.2021.10038760

Bontis, N., Ciambotti, M., Palazzi, F., & Sgro, F. (2018). Intellectual capital and financial performance in social cooperative enterprises. *Journal of Intellectual Capital*, *19*(4), 712-731. https://doi.org/10.1108/JIC03-2017-0049

Bruggen, A., Vergauwen, P. & Dao, M. (2009). Determinants of intellectual capital disclosure: evidence from Australia. *Management Decision*, *47*(2), 233-245.

Cahyadi, S. (2012). The influence of intellectual capital, Audit quality and corporate governance on company value. *Thesis, Master of Accounting Program, Postgraduate Faculty of Economics & Busines*s: Brawijaya University.

Della Corte, V., Aria, M., Del Gaudio, G., Sepe, F., & Di Taranto, E. (2021). Stakeholder value creation: A case of the hospitality industry. *Corporate Ownership & Control*, *19*(1), 314-326. https://doi.org/10.22495/cocv19i1siart8

Ewereok, V. (2018). Effect of Intellectual capital on performance of firms listed on Nigeria stock exchange. *Research Journal of Finance and Accounting*, *9*(8), 138-150.

Femianti, E. & Anantadjaya, S. P. (2014). Value creations of intellectual capital: financial performance analysis in Indonesian publicly listed consumer industry. *Review of Integrative Business Economics Research*, *3*(1), 99-113.

Gogan, L., Artene, A., Sarca, I. & Draghici, A. (2016). The impact of intellectual capital on organisational performance. *Procedia-Social and Behavioral Journal*, 221, 194-202.

Gogan, L. M., & Doran, D. C. (2014). Intellectual capital Management: a new model. *Practical Application of Science*, *2*(6), 57-64.

Gupta, K., Goel, S., & Bhatia, P. (2020). Intellectual capital and profitability: Evidence from Indian pharmaceutical sector. *Vision*, 24, 204-216. doi:10.1177/0972262920914108

Hall, J. H. (2024). Corporate shareholder value creation as Contributor to economic growth. *Studies in Economics and Finance*, *41*(1), 148-176. https://doi.org/10.1108/SEF-06-2021-0255

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022*). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 3rd ed. Thousand Oaks, CA: Sage.

Haris, M., Yao, H., Tariq, G., Malik, A., & Javaid, H. M. (2019). Intellectual capital performance and profitability of banks: Evidence from Pakistan. *J. Risk Fin. Manag.*, *12*(56). Doi:10.3390/jrfm12020056

Horibe, F. (2015). *Managing knowledge workers: new skills and attitudes to unlock the intellectual capital in your organisation*. New York: John Wiley & Sons.

Ibikunle, J., Oba, V.C. & Nwufo, C. (2013). Determinants of intellectual capital disclosures in Nigeria. *Ucta Universitatis Dabubius*, *9*(6), 195-206.

Ida, S., Nurkholis & Endang, M. (2018). Effect of intellectual capital and intellectual capital disclosure on firm value. *Journal of Applied Management*, *16*(1), 125-135.

Kapoor, J., Dlabay, I. & Hughes, R. (2009). Personal Finance. *McGraw-Hill*. 9, 80-81.

Khan, F. & Sukarno, S. (2024). The Influence of Good Corporate Governance on Firm Value before and during COVID-19 in Indonesia. *International Journal of Current Science Research and Review***,** *7*(4), 2214-2229. https://doi.org/10.47191/ijcsrr/V7-i4-26

Karabay, M. (2011). Assessing the measurement of Intangible assets in telecommunication sector: evidence from Turkey. *International Journal of Business and Management Studies*, *3*(1), 240-243.

Kavida, V. & Sivakoumar, N. (2009). Intellectual capital: a strategic management perspective. *IUP Journal of Knowledge Management, 7*(5 & 6), 55-69.

Kengatharan, N. (2019). A knowledge-based theory of the firm Nexus of intellectual capital, productivity and firms' performance. *International Journal of Manpower, 40*(6), 1056-1074, https://doi.org/10.1108/IJM-03-2018-0096.

Kristandl, G. & Bontis, N. (2007). Constructing a definition for intangibles using the resource-based view of the firm. *Management Decision*, 45(9), 1510-1524. https://doi.org/10.1108/00251740710828744

Nguyen, A. H. & Doan, D. T. (2020). The impact of Intellectual capital on firm value: Empirical evidence from Vietnam: *International Journal of Financial Research*, *11*(4), 74-85.

Nuryaman (2012). The influence of corporate governance practices on the company's financial performance. *Journal of Global Business and Economic*, *5*(1), 1-17.

Ali, O. A. (2018). The effect of disclosure of intellectual Capital components on the market price of shares in Jordanian industrial companies: An empirical study. *International Journal of Economics and Financial Issues*, *8*(5), 156-167.

Poraghajan, A. (2013). Impact of intellectual capital on market value and firms' financial performance: Evidence from Teheran stock exchange. *World of Sciences Journal*, *1*(12), 197-208.

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

Pulic, A. (2004). Intellectual capital: Does it create or destroy value? *Measuring Business Excellence*, *8*(1), 62-68.

Pulic, A. (2008). *The Principles of Intellectual Capital Efficiency: A Brief Description*. Zagreb: Croatian Intellectual Capital Center.

Putra, N. W. A. & Ratnadi, M. D. (2021). Intellectual Capital and its disclosure on firm value: Evidence of Indonesian banking industries. *International Journal of Finance & Banking Studies*, *10*(1), 86-95.

Rodoni, A., & Ali, H. (2014). *Modern financial management*. Discourse Partners: Jakarta.

Sardo, F., & Serrasqueiro, Z. (2018). Intellectual capital, growth opportunities, and financial performance in European firms: Dynamic panel data analysis. *Journal of Intellectual Capital*, *19*(4), 747-767. https://doi.org/10.1108/JIC-07-2017-0099

Shubita, M. F. (2019). Intellectual capital and market value: Evidence from Jordan. *Investment Management and Financial Innovations*, *16*(4), 37-45.

Sowaity, S. (2022) Does Intellectual Capital Efficiency Affect Earnings Quality? Evidence for Jordanian Listed Companies. *Open Journal of Accounting*, 11, 80-109. https://10.4236/ojacct.2022.112006

Wang, Z., Cai, S., Liang, H., Wang, N., & Xiang, E. (2018). Intellectual capital and firm performance: the mediating role of innovation speed and quality. *The International Journal of Human Resource Management*, *32*(6), 1222-1250. https://doi.org/10.1080/09585192.2018.1511611