

The Knowledge Economy: How Intellectual Capital Drives Financial Performance of Non-financial Service Firms in Nigeria

Adamu Umar^{1*}
Kabiru Isa Dandago²

¹*Federal Polytechnic, Kaura-Namoda, Zamfara State, Nigeria*

²*Department of Accounting, Bayero University, Kano, Nigeria*

**Corresponding Email: adamscikingida@gmail.com*

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Abstract

The study investigates the relationship between intellectual capital and financial performance of 58 listed non-financial service firms in Nigeria for a period of eleven years from 2012 to 2022. The study extracts data from annual reports and accounts of the listed non-financial service firms in Nigeria. The study aligns with correlational research design and positivism research philosophy. The modified Value-added intellectual coefficient (MVAIC) method is applied to measure the value-based intellectual performance of the sampled firms. Return on equity (ROE) and Tobin's (TQ) are used to measure the financial performance of the firms. The intellectual capital (human and structural and relational capital) of selected firms has been analyzed and their impact on financial performance has been measured using the multiple regression technique. The findings of the analysis reveal that the relationships between intellectual capital and financial performance indicators, namely ROE and TQ, are varied. The study results suggest that intellectual capital influences the financial performance of Nigeria's listed non-financial service firms. The study recommends that the board of directors of non-financial service firms in Nigeria should identify, protect and ensure effective utilization of intellectual capital in their companies in order to achieve long-term success and competitiveness. The study provides policy implications as the MVAIC method can be used as an important tool by decision-makers in the knowledge economy to integrate intellectual capital in the decision-making process.

Keywords: Modified Value-Added Intellectual Capital Coefficient, Knowledge-Economy, Financial performance, Intellectual capital.

1.0 Introduction

The global economy has undergone a profound transformation in recent decades, shifting from a traditional manufacturing-based model to one increasingly characterized by intangible assets, knowledge creation, and innovation. This transition has given rise to what is commonly referred to as the "knowledge economy," a paradigm in which the generation, distribution, and application of knowledge play a pivotal role in economic growth and development.

Nigeria, as Africa's largest economy and a regional economic powerhouse, has not been immune to this global trend. The country's diverse economic landscape encompasses a broad spectrum of industries, including a burgeoning non-financial service sector. Non-financial service firms include manufacturing, telecommunications, information technology, consulting, education, healthcare, and hospitality, among others. These firms constitute a significant portion of Nigeria's economic activity and are increasingly recognized for their role in driving innovation and productivity.

Intellectual capital, encompassing both explicit knowledge (for example, patents, databases, proprietary technologies) and tacit knowledge (for example, skills, expertise, organizational culture). It emerges as a critical determinant of competitive advantage and business success in this knowledge-driven economy

(Sofian et al., 2004). The effective utilization and management of intellectual capital can lead to enhanced efficiency, innovation, and ultimately, improved financial performance (Tran et al., 2020; Xu & Lu, 2019).

However, the relationship between intellectual capital and financial performance within the context of non-financial service firms in Nigeria remains a subject ripe for exploration (Mainoma & Nasir, 2023). While the importance of intellectual capital is widely acknowledged, there is a dearth of empirical research specifically tailored to the Nigerian economic landscape. Factors such as cultural nuances, regulatory environments, and unique industry dynamics may exert distinct influences on the interplay between intellectual capital and financial outcomes in this setting.

This study seeks to fill this gap by examining how intellectual capital impacts on the financial performance of non-financial service firms in Nigeria. This research endeavor aspires to provide valuable insights and actionable recommendations for non-financial service firms, policy-makers, and other stakeholders in Nigeria's evolving economic landscape. Ultimately, a nuanced understanding of how intellectual capital drives financial performance will be instrumental in fostering sustainable growth, innovation, and competitiveness in the Nigerian knowledge economy.

The rest of this paper proceeds as follows: section two reviews related empirical studies; section three describes the methodology of the study; section four presents the results and discussion; and section five concludes the study.

2.0 Literature Review and Formulation of Hypotheses

Theoretical and Conceptual Framework

Many studies that focused on effect of board attributes on intellectual capital are mainly based on resources dependency theory. As hinted by Pfeffer & Salancik (1978), resource dependence theory seeks to explain the behavior of the organization in its actions and decision-making. This theory was developed by Pfeffer and Salancik in 1978. The theory assumes that firms can minimize environmental dependences through mergers; joint ventures; board of directors; political action; and executive succession (Hillman et al., 2009). The theory posits that a company is an open system that depends on the external environment and contingencies (Pfeffer & Salancik, 1978). However, the theory recognizes the role of the managers in controlling such contingencies and dependency. Therefore, the power to control the external environment specifically rests on the board.

Resource Dependency Theory (RDT) implies that effective board will safeguard the firm's ability to attract more valuable resources. The theory provides a theoretical framework to understand how organizations rely on and manage their resources to achieve competitive advantage and financial performance. When applied to the context of intellectual capital and financial performance of listed non-financial service firms in Nigeria, RDT offers valuable insights into the dynamics of resource allocation, acquisition, and utilization.

In the Nigerian business environment, non-financial service firms are subject to a range of dependencies on external resources such as human capital, technology, knowledge networks, and regulatory support. Understanding how these firms leverage intellectual capital within the context of RDT can shed light on the strategies they employ to mitigate dependencies and enhance financial performance.

Financial performance is a critical indicator of a company's health, reflecting the overall economic well-being, growth, prospects and stability of a company. Financial performance represents how well a company is doing in terms of generating revenue, profitability, efficiency and other related financial

metrics. In today's complex and dynamic business environment, the assessment of financial performance is of paramount importance for both companies and stakeholders (Olanisebe et al., 2023).

In knowledge economy, intellectual capital can be considered as a major driver of value and competitiveness of the firm (Ciprian et al., 2012). Sullivan (2000) defines intellectual capital as a collection of ideas, investment, technology and publications that turn knowledge into benefit to the organization.

Researchers classify intellectual capital in to human capital, structural capital and relational capital (Mondal & Gosh, 2012; Tran et al., 2020; Xu & Lu, 2019). Human capital is a resource produced by employees from the knowledge, skills, talent or competencies they acquire from or outside the company (Quintero-Quintero et al., 2021). It is a dynamic capital that contributes to the growth and development of the organization (Antosova & Csikosova, 2011). Structural capital is an organizational knowledge stored in the databases, processes and manuals (Quintero-Quintero et al., 2021). Structural capital can be found in organizational processes, norms, technology, brand and know-how (Antosova & Csikosova, 2011). Relational capital is regarded as the firm relationship with other stakeholders of the company such as customers and suppliers (Stewart, 1997). It includes knowledge and skills relating to customers, suppliers and other associates of the company that enhance performance (Onyekwelu, 2017).

Association between Intellectual Capital and Financial Performance

Intellectual capital is recognized as a critical factor of value creation in the knowledge economy and a viable tool for the generation of competitive financial performance (Bala et al., 2019). Prior empirical evidence revealed a positive relationship between intellectual capital and financial performance measured by return on equity (ROE), return on asset (ROA) and/or Tobin's q. For instance, Shaneeb and Sumathy (2021) revealed a significant positive impact of intellectual capital on the ROE and ROA of the sampled Indian firms. Fathi et al. (2013) revealed a significant positive impact of IC on ROE and ROA of the sample Tehran firms. Also, Bansal and Singh (2020) reported a significant positive effect of IC on the ROA and ROE of Nigerian firms. Anghel et al. (2018) revealed a significant positive impact of intellectual capital on the ROA and ROE of the sampled US firms. Therefore, the study hypothesizes that:

H_{1a}: Intellectual capital has a significant positive impact on the return on equity of non-financial service firms in Nigeria.

H_{1b}: Intellectual capital has a significant positive impact on the Tobin's q of non-financial service firms in Nigeria.

Association between Intellectual Capital Components and Financial Performance

Also, empirical evidence revealed that intellectual capital components such as human capital, structural capital and relational capital increase the financial performance of firms. However, studies such as Chowdhury (2018) revealed that structural capital efficiency (SCE), human capital efficiency (HCE) and capital employed efficiency (CEE) significantly and positively impact the ROA, ROE and asset turnover of the sampled Bangladesh firms. Ousama and Hammami (2019) revealed that HC and CEE have a significant positive impact of the ROA and ROE of the sample Golf Corporation Countries firms. Also, Kasoga et al. (2020) revealed that SCE has a significant positive impact on ROA while HCE and CEE have a significant negative impact on ROA of the sampled firms. Value-added intellectual coefficient (VAIC) has a significant positive impact on the ROA of the listed service and manufacturing firms in Tanzania in the period under review. Therefore, it is hypothesized that components of intellectual capital have a significant positive impact on financial performance:

H_{2a}: Human capital has a significant positive impact on the return on equity of non-financial service firms in Nigeria.

- H_{2b}: Human capital has a significant positive impact on the Tobin's q of non-financial service firms in Nigeria.
- H_{3a}: Structural capital has a significant positive impact on the return on equity of non-financial service firms in Nigeria.
- H_{3b}: Structural capital has a significant positive impact on the Tobin's q of non-financial service firms in Nigeria.
- H_{4a}: Relational capital has a significant positive impact on the return on equity of non-financial service firms in Nigeria.
- H_{4b}: Relational capital has a significant positive impact on the Tobin's q of non-financial service firms in Nigeria.

3.0 Methodology

Sample and Data

The population of the study covers the entire one hundred and seven (107) listed non-financial service firms in Nigeria as of 31st December 2022. These firms cut across agriculture, construction, consumer goods, healthcare, ICT, industrial goods, natural resources and services firms in Nigeria. These firms were selected due to the role they play in the economic activities of Nigeria. The study used the filtering method as a sampling technique. Because some of the information is not available in the annual reports and accounts of the firms for data generation. Therefore, the study set the following filter in selecting the only firm that meets the criteria: a) to remove any company under technical suspension; b) to remove any company with missing data needed for the study; c) to remove any company with outlier data; and d) to remove any company that is not listed as at 31 December 2012. After applying the filter, 58 firms constitute the sample of the study

Variables Definition and Measurement

The study uses three (3) different sets of variables, the dependents variable (proxied by return on equity and Tobin's q), the independent variable (proxied by MVAIC, HCE, SCE and RCE) and the control variables (firm size, leverage and industry dummy) in order to test the hypotheses of the study.

Independent Variables

The calculation of MVAIC, as guided by (Xu & Lu, 2019), is shown below:

$$VA=OUT-IN \dots \dots \dots (1)$$

$$ICE=HCE+SCE+RCE \dots \dots \dots (2)$$

$$MVAIC=ICE+CEE \dots \dots \dots (3)$$

Where:

CEE=VA/CE; HCE=VA/HC; SCE=SC/VA; RCE=RC/VA, OUT is the total revenues; IN is the total expenses less employee expenditures; CE is total assets minus liabilities; HC is the total employee expenditures; SC I the VA-HC and RC is the marketing, selling and advertising expense.

Dependent Variables

The firm financial performance is measured by return on equity and Tobin's q. These measures have been used frequently by the previous literature (Akbar, 2021; Rositha et al., 2019).

$$ROE = (\text{EARNING AFTER TAX}) / (\text{SHAREHOLDERS EQUITY}) \times 100\%$$

Tobin’s q measured performance by revealing the company’s future performance. The ratio measures whether the firms are over or under-valued (Adams & Ferreira, 2007; Aldaoud et al. 2016).

$$\text{TOBINS'Q} = (\text{TOTAL MARKET VALUE EQUITY} + \text{TOTAL DEBT}) / (\text{TOTAL ASSET}) \times 100\%$$

Control Variables

Larger firms tend to enjoy economies of scale which result in improved performance (Kajola, 2017). Therefore, the size of the firm is a major determinant of performance. Studies define firm size as a log of total assets (Aslam & Haron, 2020; Bala et al., 2019; Kajola, 2017; Shahwan & Fathalla, 2020). Investors tend to focus on the financial standing point of the firm before investing (Bala et al., 2019). Therefore, leverage is considered a major determinant of profitability. Literature defined leverage as a ratio of total debt to total assets (Aslam & Haron, 2020; Bala et al., 2019; Kajola, 2017). These are variables that are included to explain the industry effect by capturing differences across the firms (Alkurdi & Mardini, 2020). These differences seem to influence the financial performance of Nigeria’s sampled listed non-financial firms.

Regression Models

Model 1 and Model 2 measure the relationships between ROE and Tobin’s q and the aggregate measure of IC (MVAIC). The last two models (Models 3 and 4) are used to assess each of the components of MVAIC (HC, SC and RC) and the dependent variables.

$$\text{ROE}_{it} = \alpha + \beta_1\text{MVAIC}_{it} + \beta_2\text{FSIZE}_{it} + \beta_3\text{LV}_{it} + \beta_4\text{IE}_{it} + e_{it} \dots\dots\dots (1)$$

$$\text{TQ}_{it} = \alpha + \beta_1\text{MVAIC}_{it} + \beta_2\text{FSIZE}_{it} + \beta_3\text{LV}_{it} + \beta_4\text{IE}_{it} + e_{it} \dots\dots\dots (2)$$

$$\text{ROE}_{it} = \alpha + \beta_1\text{HC}_{it} + \beta_2\text{SC}_{it} + \beta_3\text{RC}_{it} + \beta_4\text{FSIZE}_{it} + \beta_5\text{LV}_{it} + \beta_6\text{IE}_{it} + e_{it} \dots\dots\dots (3)$$

$$\text{TQ}_{it} = \alpha + \beta_1\text{HC}_{it} + \beta_2\text{SC}_{it} + \beta_3\text{RC}_{it} + \beta_4\text{FSIZE}_{it} + \beta_5\text{LV}_{it} + \beta_6\text{IE}_{it} + e_{it} \dots\dots\dots (4)$$

Where:

e= Error terms in the course of year t for firm I; α = Intercept or constant; $\beta_1 - \beta_6$ = Coefficient of parameters for firm i in year t; i = firms; t = year

4.0 Results and Discussion

Descriptive statistics and correlation analysis

Table 1: Descriptive Statistics

Variable	Obs	Mean	SD	Minimum	Maximum
ROE	638	0.058	0.292	-0.794	0.581
TQ	638	1.145	1.009	1.174	3.763
HCE	638	2.422	2.342	-2.011	8.331
SCE	638	0.660	0.527	-0.395	2.210
RCE	638	0.289	0.361	-0.200	1.164
MVAIC	638	3.868	2.819	-2.059	10.27
FSIZE	638	23.59	1.780	19.38	28.61
LV	638	0.180	0.192	0.000	0.672
IE	638	1.466	0.499	1.000	2.000

Source: STATA 14.2 Output, 2023.

Table 1 shows that non-financial service firms listed at the Nigeria Stock Exchange from 2012-2022 had a minimum ROE of -0.794 and maximum 0.581. The average ROE of non-financial service firms listed at the Nigeria Stock Exchange from 2012-2022 was 0.059. The standard deviation of 0.292 indicate a high dispersion from the mean value of 0.059. On the other hand, the table 1 shows that, the sample firms had a minimum Tobin's q of 0.174 and maximum 3.763. The average Tobin's q was 1.145. The standard deviation of 1.009 indicate that the data is clustered around the mean value of 1.145. Furthermore, Table 1 reveals that human capital (HCE) of the sampled firms had a minimum of -2.011 and maximum of 8.33 human capital for the period 2012 to 2022. The sampled non-financial service firms in Nigeria indicate an average human capital of 2.422 and a standard deviation of 2.342 which indicates a significant dispersion around the mean value of 2.422. Table 1 shows that structural capital (SCE) of the sampled non-financial service firms in Nigeria had a minimum of -0.395 and maximum of 2.210 structural capital for the period 2012 to 2022. The sampled non-financial service firms in Nigeria indicate an average structural capital of 0.660 with a standard deviation of 0.527 which indicates a moderate dispersion around the mean value of 0.660.

Table 1 reveals that relational capital (RCE) of the sampled non-financial service firms in Nigeria had a minimum of -0.200 and a maximum of 1.164 relational capital for the period 2012 to 2022. The sampled non-financial service firms in Nigeria indicate an average structural capital of 0.289. Table 1 reveals a standard deviation of 0.361 which indicates a moderate dispersion around the mean value of 0.289. Table 1 reveals that intellectual capital (MVAIC) of the sampled non-financial service firms in Nigeria had a minimum of -2.059 and a maximum of 10.27 coefficient for the period 2012 to 2022. The sampled non-financial service firms in Nigeria had an average of 3.868 with a standard deviation of 2.819 which indicates a moderate dispersion around the mean value of 3.868. Table 1 also shows that firm size (FSIZE), leverage (LV) and industry dummy (IE) of the sampled listed non-financial service firms in Nigeria from 2012 to 2022 have a minimum of 19.38, 0 and 1 respectively with a maximum value with a maximum value of 28.61, 0.672 and 2 respectively. The firm size of the sampled firms reveals a mean value of 23.59 and standard deviation of 1.781 which indicate a significant dispersion from the mean value for the period under review. Also, leverage of the period reveals an average of 0.181 and standard deviation of 1.192 which highlight a significant dispersion from the mean value for the period. Lastly, industry shows a mean value of 1.466 and a standard deviation of 0.499 which indicates a significant dispersion from the mean value for the period.

Table 2: Person Correlation

Variable	ROE	TQ	HCE	SCE	RCE	MVAIC	FSIZE	LV	IE	VIF
ROE	1.000									
TQ	-0.005	1.000								
HCE	0.504	-0.016	1.000							1.29
SCE	-0.138	0.135	-0.076	1.000						1.34
RCE	0.096	-0.028	0.029	-0.472	1.000					1.50
MVAIC	0.511	-0.056	0.910	0.055	0.068	1.000				1.30
FSIZE	0.203	0.149	0.353	-0.004	0.026	0.361	1.000			1.17
LV	-0.268	0.132	-0.298	0.169	-0.124	-0.286	0.002	1.000		1.16
IE	-0.143	-0.256	-0.163	0.052	-0.349	-0.223	-0.113	-0.161	1.000	1.21

Source: STATA 14.2 Output, 2023.

Table 2 displays the Pearson correlation matrix of the study variables. The results show the highest correlation coefficient of 0.910 between HCE and MVAIC. This is higher than the threshold of 0.8 suggested by Hair et al. (2014), Thus, the study ran the variance inflation factor (VIF) test to check the presence or otherwise of multi-collinearity problem; the outcome of the test indicates the absence of multicollinearity problem in the regression estimates. Furthermore, the correlation matrix shows that HCE, RCE, MVAIC and FSIZE have positive coefficient with ROE, while SCE, LV and IE have negative coefficient with ROE respectively. Equally, evidence from Table 2 indicates that SCE, FSIZE and LV have Positive coefficient with TQ respectively. Finally, HCE, RCE, MVAIC and IE have negative coefficient with TQ.

Regression Result

Table 3 reveals the empirical results of all 58 non-financial service firms for eleven years, from 2012 to 2022. The empirical results show that independent variables collectively explain 27 and 10 percent of the variation in ROE and TQ respectively, which are statistically significant.

Table 3: Regression Results

	ROE		TQ	
	Coeff.	P-value	Coeff.	P-value
Cons.	-0.218	-1.55	0.215	0.40
MVAIC	0.047	11.82***	0.001	0.09
FSIZE	0.006	1.02	0.066	2.87**
LEV	-0.206	-3.80***	0.924	4.44***
IE	-0.009	-0.44	-0.546	-0.97***
Model Summary				
P-Value	0.000		0.000	
Adjusted R ²	27%		10%	

Source: STATA 14.2 Output, 2023.

The Table 3 reveals that MVAIC positively and significantly influences the financial performance of the sampled non-financial service firms measured by ROE ($\beta=0.047, P=0.000$) while MVAIC positively and insignificantly influences the financial performance of sampled non-financial service firms ($\beta=0.001, P=0.927$). The impact of firm size on financial performance appears to be insignificantly positive ($\beta=0.006, P=0.308$), while firm size appears to be positive and significant on TQ ($\beta=0.066, P=0.004$). Leverage of the non-financial service firms and ROE are seen to be significantly and negatively related in the years 2012- 2022 ($\beta=-0.206, P=0.000$) while a positive significant association is found in case of leverage with TQ ($\beta=0.924, P=0.000$). Also, industry effect reveals a negative and insignificant effect on ROE ($\beta=-0.009, P=0.661$) while industry effect reveals a negative and significant effect on TQ ($\beta=-0.546, P=0.000$). Thus, empirical results of Table 3 support H1a that MVAIC has a significant effect on ROE of listed non-financial service firms in Nigeria. Therefore, from the results of the Table 3, intellectual capital of the sampled firms significantly influences financial performance.

Table 4 show the regression results of components of MVAIC and financial performance (ROE and TQ). The statistical association between components of MVAIC and financial indicators provide those independent variables explained 27% and 12% of the total variation of ROE and TQ of the sampled firms respectively. The empirical results show that HCE and firms' financial performance as measured by ROE

is positive and significant ($\beta = 0.055, P=0.000$). However, regression results of TQ and HCE is negative and insignificant ($\beta = -0.028, P=0.121$).

Table 4 Regression Results

	ROE		TQ	
	Coeff.	P-value	Coeff.	P-value
Cons.	-0.154	-1.06	0.073	0.13
HCE	0.055	11.54***	-0.028	-1.55
SCE	-0.040	-1.84*	0.166	2.01*
RCE	0.176	0.53	-0.218	-1.72*
FSIZE	0.007	1.15	0.079	3.48**
LEV	-0.175	-3.17**	0.717	-3.42**
IE	-0.021	-0.98	-0.615	-7.44***
Model Summary				
P-Value	0.000***		0.000***	
Adjusted R ²	27%		13%	

Source: STATA 14.2 Output, 2023.

Thus, empirical results of Table 4 support H2a that HCE has a significant effect on ROE of listed non-financial service firms in Nigeria. Also, SCE and ROE reveals a negative and significant effect for the period under review ($\beta = -0.039, P=0.066$) while SCE and TQ reveals a positive and significant effect for the period under review ($\beta = 0.166, P=0.045$). Thus, empirical results of Table 4 support H3a and H3b that SCE has a significant effect on ROE and TQ of listed non-financial service firms in Nigeria. The empirical results show that RCE and ROE is positive and insignificant ($\beta = 0.018, P=0.600$). However, regression results of TQ and RCE is negative and significant in the year 2012-2022 ($\beta = -0.218, P=0.087$). Thus, empirical results of Table 4 support H4b that RCE has a significant effect on TQ of listed non-financial service firms in Nigeria.

The impact of firm size on ROE appears to be insignificantly positive ($\beta = 0.006, P=0.249$), while firm size appears to be positive and significant on TQ ($\beta = 0.079, P=0.001$). Leverage of the non-financial service firms and ROE are seen to be significantly and negatively related in the years 2012- 2022 ($\beta = -0.175, P=0.002$) while a positive significant association is found in case of leverage with TQ ($\beta = 0.717, P=0.001$). Also, industry effect reveals a negative and insignificant effect on ROE ($\beta = -0.154, P=0.289$) while industry effect reveals a negative and significant effect on TQ ($\beta = -0.615, P=0.000$). The regression results of the association between components of MVAIC and firm financial performance as measured by ROE and TQ are interesting. The statistical results show that human, structural and relational capital are important for enhancing financial performance. However, RC is least important as compared to human and structural capital. This result is consistent with the findings of Mondal and Ghosh (2012) who found that IC influence the performance of the banks but all Components of IC contribute to the financial performance. The finding is also consistent with Shahwan and Fathalla (2020); Tran et al., (2020); Xu & Lu (2019).

5.0 Conclusion and Recommendations

The study investigates the relationship between IC and two dimensions of financial performance (ROE and TQ). The empirical findings indicate that IC is an important determinant of financial performance of

the listed non-financial service firms in Nigeria. Also, when the measure of IC is classified into major components, the efficiency of HC, SC and RC plays major roles in enhancing the financial performance of the sample firms. This suggests that an increase in HC, SC and RC investment enhances the firms' financial performance. The study suggests that board of directors of non-financial service firms in Nigeria should identify, protect and ensure effective utilization of intellectual capital in their companies in order to achieve long-term success and competitiveness. The board should be willing to invest in technology that enhances knowledge management and develop a robust succession plan for key knowledge holders within the organization.

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