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Intangibles, Intellectual Capital, and the Performance of Listed Non-Financial Services Firms in West Africa: A Cross-Country Analysis

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Abstract: This study aims to examine the impact of intellectual capital and intangible value on the performance of listed non-financial firms in West Africa. The study used the Value Added Intellectual Coefficient (*VAIC*™) to measure intellectual capital performance (with components as *ICE*—Intellectual Capital Efficiency an additive measure of the next two metrics, *HCE*—Human Capital Efficiency, *SCE*—Structural Capital Efficiency and *CEE*—Capital Employed Efficiency), financial ratios to measure intangible value and return on assets to measure performance while controlling for firm-level and macroeconomic variables. Using the panel-corrected standard error regression on 59 firms operating from 2007 to 2018, the study found that *VAIC*, *ICE*, *HCE* and *SCE* measures of intellectual capital are the *pièce de résistance* that drive the performance of firms. It is found that the relationship is curvilinear taking the shape of an inverted U. *CEE* does not drive the performance of firms, and asset tangibility inhibits performance but the investment in intangible fixed assets has a positive insignificant effect on performance. Firm size has a positive impact while financial leverage has a negative impact on performance. Human development does not drive performance but foreign direct investment and economic development do. There are country-specific insights where in Ghana intellectual capital and intangible value have a very strong positive effect on performance, followed by a relatively high impact in Cote D'Ivoire while there is a weak effect in the Nigerian context. The study also explores the effect of other variables such as firm size, financial leverage, human development, foreign direct investment and economic development. The findings are useful for policy, accounting, finance, economic and human resource practitioners as well as, for the academic community.

Keywords: intellectual capital; intangible assets; stock market; performance; IAS 38; emerging technologies; West Africa

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1. Introduction

In recent times, there have been critical concerns about how COVID-19 impacted firms, especially during the lockdown period. Many firms had to close down their property, plant and equipment, with some resorting to remote working, and the use of information technology, with a negative impact on employees. There was a significant acceleration of the transition to the fourth industrial revolution as all businesses have to adjust to withstand the impact of the pandemic. However, firms that have invested in their knowledge-based resources were resilient while others have to catch up as a way to maintain their performance [1]. Intangible assets (or intellectual capital or intellectual assets) are the intangible resources held by firms that are usually not physical in nature and are identifiable non-monetary assets without physical substance [2–7]. Examples include software, patents, goodwill and licenses, which may be identified by the financial accounting-based corporate reports while customer lists and relationships, non-compete agreements, favourable financing, trained and assembled workforces, contracts, leasehold interests, and trade secrets are not captured at by the current accounting system. Despite the role that research and development (R&D), brands, or goodwill play for firms, unless they are internally generated or

meet stringent accounting requirements, they are not captured in the financial statements of firms. Even more, customer lists and relationships and non-compete agreements, among others, are not captured at all in any financial accounts.

Various studies have attempted to capture intellectual capital with different models having been developed, which are categorized under six approaches, namely, the Corrado et al. [8] expenditures-based approach, the survey-based measurement of expenditures approach, the measurement based on firm balance sheet data, occupation or task-based approach, intellectual property rights-based measures and market valuation approach [9]. The need to do these sorts of exercises is because, if it cannot be measured, then it cannot be managed, and the relevance or otherwise in the corporate strategic efforts will be downplayed. In fact, research shows that while in the 1970s about 80% of the corporate value is captured in the financial accounting-based records as they are mainly physical in nature, in the current business ecosystem, only 20% of the corporate value is tangible assets while the 80% are now in intangible assets [7,10,11]. The post-pandemic context is even more interesting as intangibles now form more than 90% of S&P 500 companies. Moreover, there are increasing investments in intangible assets that continue to increase in value. The accounting standards developed by the International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) failed to capture these things, but some researchers have developed alternative models to help in drawing insights after examining the role intangibles play in driving corporate profitability, efficiency, financial stability, productivity, and the strategic stance they take [9].

The quest to link intangibles or intellectual capital to corporate financial performance is not a new area of interest. Several review articles have explored the different studies conducted on intellectual capital, but what is so clear is the inconclusiveness of the findings, which beg for further studies to provide an eclectic understanding of the issues [9,12–18]. For instance, many studies have been conducted on developed economies, such as countries in the European Union and North America, for instance. There are different results evident in the literature on how intellectual capital or its components affect corporate performance as a result of the different business climates, macroeconomic fundamentals, governance factors and social factors that prevail in these countries. For African countries, studies have been few with a significant number of them focusing on banks because their financials are readily available [5,6,19]. However, the stock exchange-listed firms have both financial services and non-financial services firms that can be explored. The non-financial services firms provide a unique gap in the literature that needs to be explored. For instance, these firms include firms operating in industries with a focus on basic materials, consumer goods, consumer services, industrial services, oil and gas, telecom/technology, health, and real estate [20] among others. These industries use significant intangibles as a strategic tool and it is useful to understand how intellectual capital drives them. Moreover, the capital structure and regulatory measures in the financial services firms (banks, insurance firms or other financial institutions) differ significantly from what is evident in the non-financial services firms, which cannot be highly leveraged such as the banks, for instance.

This study aims to fill the dearth in the extant literature on understanding the impact of intellectual capital and intangibles on performance. In addition, the study focused on a cross-country analysis within the West African context, which has emerging economies. Most studies in the extant literature focus on one country, but this study is unique in providing cross-country insights within both the Anglophone and Francophone West African contexts. Moreover, African studies on the concepts are focused on banks without focusing on the stock market and little is even known about non-financial firms. This study sets out to address three distinct research questions that emerged from the review of the literature. The research questions are: (1) What is the impact of intellectual capital (measured by *VAIC* and *ICE*) on the performance of listed non-financial services firms in West Africa? (2) What is the impact of the components of intellectual capital (including *HCE*, *SCE* and *CEE*) on the performance of listed non-financial services firms in West Africa? and

(3) What are the country-specific effects of intellectual capital and its components on the performance of listed non-financial services firms in Ghana, Nigeria and Cote D'Ivoire? To address these questions, the study used the Value Added Intellectual Coefficient (*VAIC*™) model by Pulić, [21] and its components to measure intellectual capital while financial ratios are used to measure the intangible values of the firms. Firm performance is measured by return on asset and firm-level control variables are firm size, and financial leverage but country-level controls are human development foreign direct investment and economic development. The study used the panel corrected standard error regression on 59 firms in three West African countries including Ghana, Nigeria and Cote D'Ivoire that operated over the period 2007 to 2018.

The results show that intellectual capital has a positive effect on the performance of listed firms. Specifically, *VAIC*, *ICE*, *HCE* and *SCE* have a positive significant impact on performance, but in the long run, this link has an inverted U-shape. It is evident that *CEE* does not drive the performance of firms. The study also shows that asset tangibility inhibits performance, but investment in intangible assets has a positive insignificant effect on performance. As regards the country-specific context, in Ghana, all the intellectual capital and intangible proxies enhance the performance of firms. For the context of Cote D'Ivoire, there is an inverted U-shaped impact of both *VAIC* and *ICE* but only *SCE* among the components drive performance. In addition, asset tangibility inhibits performance, while investment in fixed asset intangibles enhances the performance of firms. In the case of Nigeria, there is evidence of some level of inverted U-shaped nexus between intellectual capital and performance albeit weak while only *SCE* drives performance among the components. Although asset tangibility is found to inhibit performance, investment in intangibles does not impact performance. These findings provide relevant insights that are useful for policymakers, practitioners and the academic community. The results are also relevant for human resource management practitioners in understanding the intellectual capacity-building initiatives to promote their quest to contribute to corporate performance. This is also key as the findings show the relevance of human capital and structural capital, in which the human resource function plays a critical role in recruiting or procuring.

This study is structured under six sections starting from the current section. Section 2 provides a review of the theoretical and empirical literature with the development of relevant hypotheses. Section 3 provides an extensive discussion of the methodology and methods used for the study. Next, Section 4 presents the results and discusses them in line with the extant literature and the hypothesized linkages. Section 5 provides an eclectic discussion of the implications of the study for policy, practice and future research, while Section 6 draws conclusions from the study.

2. Literature Review and Hypothesis Development

We proceed to review the theoretical and empirical literature on intellectual capital, intangibles and performance. Based on the various theoretical underpinning, we developed various hypotheses to support the study.

2.1. Concept of Intangibles and Intellectual Capital

There are tangible and intangible resources that firms use to create value and drive performance. However, the accounting standards that exist over time have always focused on tangible assets while ignoring intangible assets. Tangible assets are physical and include property plant and equipment, inventory, cash and other related assets. However, intangible assets (or intellectual capital or intangible capital) are not physical and could have features such as identifiability, control (power to obtain benefits from the asset) and future economic benefit (such as revenues or reduced future costs). International Accounting Standard (IAS) 38 defines an intangible asset as an identifiable nonmonetary asset without physical substance. An asset is a resource that is controlled by the enterprise as a result of past events (for example, purchase or self-creation) and from which future

economic benefits (inflows of cash or other assets) are expected [22]. Intangible assets are the intangible value-creating resources of organisations including their overall knowledge base [4,6,23,24]. There are numerous types of intangible assets that firms use, which may include patents, copyrights and licenses, customer lists and relationships, non-compete agreements, favourable financing, brand, software, trained and assembled workforces, contracts, leasehold interests, unpatented proprietary technology, trademarks/trade names, and trade secrets among others. These useful resources are all paramount in creating value for firms, yet the accounting standards or existing financial models do not capture them completely.

There have been critical concerns about the low level at which the current accounting systems capture intangible assets [11,25]. Various studies on IAS 38: Intangible Assets and the FASB Summary of Statement No. 142 reveal how the accounting standards fail to comprehensively measure and account for intangible assets [11,17]. This has resulted in a significant difference between the real value of firms and the book values, which are significantly low. Yet in the current context where intangible assets continue to thrive and are strategic resources for businesses, it is useful to understand how these resources drive other corporate variables. Firms with low tangible value have been valued highly because of their significant unaccounted intangible values. Measurement of intangible value has been partial with some focus on goodwill, patents, licences, as well as research and development (R&D). However, other intangible values that are not purchased by a business will be unaccounted for; although, they may be generated internally by the organisation. This makes the financial records unable to reflect the true values of companies.

If it cannot be measured, it cannot be managed or used to enhance strategic performance. There are varied efforts to measure intangible values. Van Criekingen et al. [9] identified six different approaches to measuring intangible assets, which include the Corrado et al. [8] expenditures-based approach, the survey-based measurement of expenditures approach, the measurement based on firm balance sheet data, occupation or task-based approach, intellectual property rights-based measures and market valuation approach. The expenditures-based approach of Corrado et al., [8] provides a macroeconomic framework that measures intangible assets. They categorized the intangible assets into three groups, namely, economic competencies, innovative property and computerized information [9,26]. The second is the survey-based measurement of expenditures with the aim to use survey instruments to measure the investments in intangibles. Innovation surveys tend to focus on R&D, training, design, purchase of intellectual property rights, and other related resources linked to the development, testing and implementation of product and process innovations [27,28]. Various studies have discussed or used different forms of the survey-based approach [29–33].

The other approaches are the balance sheet-based approach and the occupation or task-based approach. The balance sheet data-based approach uses financial accounting data prepared based on accounting standards to account for intangible assets and explore how they relate to other corporate issues. In some instances, there is a focus on intangible fixed assets [34,35], R&D expenditure, or a portion of selling, general and administrative (SG&A) expenditure (preferably 30%) [36]. Other studies also use different metrics based on balance sheet information to model intangible assets [37–39]. The occupation or task-based approach is also a type of expenditure-based approach. It aims to quantify the intangible investments by focusing on the resources used to generate the intangibles, with estimates developed both of own-account and purchased investments. There are three assumptions used in this case: firstly, new knowledge or know-how is generated internally by employees in knowledge-intensive occupations; secondly, a part of knowledge-intensive workers' time is dedicated to the development of intangible capital; and thirdly, an estimate of purchased intangible capital must be connected to the own-account activities. Examples of these have been employed in some existing studies [40–44].

The fifth and sixth approaches are the intellectual property right (IPR)-based measures and the market valuation approach. For the IPR-based measures, there is an innovation production function developed where the inputs are investments in innovation property while the IPRs are the output of the function. Formal IPR counts are considered, which consist of the number of trademarks, patents, and designs that are actually crude measures of the volume of protected intangible capital in a firm. The use of this approach seems very limited as it is utilised mostly in industries that rely heavily on IPRs for their innovation [45–47]. When accounting approaches fail, there is a focus on market-based models and the market valuation approach is the sixth approach. In this context, there is a residual approach adopted where the difference between the book value (without accounting for intangibles) and the market value is regarded as the intangible asset value. There are various models being developed under this, which include Tobin's Q [7], the *VAIC* model [48], the balanced scorecard [49], the Skandia model [50], the Intangible Assets Monitor [23], IC-dVAL [51], and the Value Chain Scorecard [25] among others. Some others also develop the value of intangibles from market-based transactions such as using acquisition prices to estimate intangible capital stocks [52]. The *VAIC* model is one of the most used models as it is underpinned by financial information, which is comparable.

2.2. Intangibles, Intellectual Capital and Firm Performance

There are different types of studies that have explored the impact of intangibles and intellectual capital on the performance of firms [14–16,18]. In the extant literature, a significant number of studies have focused on the financial services sector [53,54], listed firms [7,55–57], the pharmaceutical industry [2,3,58], the hospitality industry [59,60] and small and medium-sized firms [12]. The performance metrics used differ covering profitability measures [7], efficiency measures [4,19], productivity metrics [61–63], risk or stability metrics [64] and other corporate performance appraisal concepts. The studies that used the market-based *VAIC* model, also focus on the components that include human capital efficiency, structural capital efficiency and capital employed efficiency. Not all of the components impact performance, and there are some contexts where some components may have negative or insignificant effects on the performance of firms.

Studies have explored the effect of intellectual capital on performance with different results based on industry, continental focus and the years under study. A study explored intellectual capital reporting among listed firms in Sri Lanka and Australia concluding that differences exist that are driven by economic, social and political factors [57]. Another study explored the effect of intellectual capital on technical, allocative and cost efficiencies on commercial banks operating in 31 African countries over the period 2005 to 2015 [19]. The study found that intellectual capital has a positive significant impact on technical, allocative and cost efficiencies. The study further reveals that among the components of intellectual capital, only *HCE* has a significant impact while *SCE* and *CEE* do not significantly drive the efficiency of the firms. In addition, another study explored the impact of intellectual capital on slack-based technical efficiency among banks in Ghana over the period 2000 to 2017 [4]. The study found that intellectual capital drives efficiency with human capital as the main element. It is found that among listed firms in Australia that operated between 2004 and 2008, intellectual capital affects performance, which is driven significantly by *CEE* and *HCE* to some extent [65].

There are other studies that also find different results on the impact of intellectual capital on performance. Using the knowledge-based theory, a study used a survey instrument to explore the link between intellectual capital, productivity and firm performance [63]. The study found that intellectual capital enhances productivity. Moreover, there is a mediated connection between the components of intellectual capital and firm performance. Again, in the Greek context, a study examined 96 listed firms that operated from 2006 to 2008 and found that most hypotheses on the positive impact of intellectual capital on performance are falsified, except for the impact of human capital efficiency on financial performance [66]. Another study asserted that among the banks operating in Ghana from 2000 to 2015, human

capital efficiency is the sole driver of their performance and financial stability [64]. The study found also that structural capital efficiency has a negative impact on performance while *CEE* has a positive impact but both are insignificant. However, within the Indian context, researchers studied the innovation-driven pharmaceutical firms over the period 2009 to 2018 and found that intellectual capital drives performance [3]. However, *CEE* has the highest predictive power among the components of intellectual capital, suggesting that physical resources still play a key role in the performance of the firms. A recent study found that the impact of intellectual capital on performance varies depending on whether financial services or non-financial services firms are considered [7]. Using listed firms that operated from 2008 to 2017 in Ghana and return on equity and return on asset as performance measures, they found that intellectual capital and its components enhance both performance metrics. However, for the non-financial services firms, intellectual capital and its components only increase the return on assets.

Across the entire literature, there is clear evidence of different impacts of intellectual capital or its components on performance depending on the period, the industry, the country, the continent and the methods used. This suggests that the findings are not yet conclusive and other areas that are less explored, such as listed firms in the developing economy context, should be examined.

2.3. Theoretical Review and Hypothesis Development

In discussing the theoretical underpinning of the study on the intellectual capital, intangible assets and performance nexus, the resource-based theory serves as the genesis. For the resource-based theory, the quest to identify, and exploit strategic capabilities such as competencies and resources are vital to the sustainability, competitive advantage and success of firms [67–70]. There are different tangible and intangible assets at the disposal of firms, yet intellectual capital continues to be a critical and strategic resource in the current knowledge economy [63,69,71]. The focus on the knowledge-based resources of firms underlies the move towards the knowledge-based theory of firms. While the resource-based theory focuses on the capabilities of the firm as a source of competitive advantage, the knowledge-based theory pays attention to the knowledge embedded in individual employees and the firm as a whole, considering the systems and processes available [63,72].

A review of extant literature shows that intellectual capital has been sub-divided into human capital, structural capital (including organizational capital), and relational capital/customer capital but have now been confined into three facets, namely, human capital, social capital and organizational capital in line with the characteristics of knowledge [72–75]. In the quest to develop the *VAIC* model, Pulic [48] developed the components of intellectual capital efficiency to be human capital efficiency and structural capital efficiency, which together yield intellectual capital efficiency. Moreover, while intangibles have a competitive and transient advantage for firms, there is still the role for financial or physical capital in driving performance [5,6]. Thus, the capital employed efficiency has been added to the model [76]. It is the addition of the three components that, thus, yield to *VAIC*, the composite metric for intellectual capital. With the competitive advantage and transient advantage that intellectual capital creates, both intellectual capital and its components are expected to augment the performance of firms.

There are two additive models from the original work on the *VAIC* model. This included *ICE* and *VAIC*, which combine the first two components, human capital and structural capital, or the latter, which has all three. *VAIC* as an index represents how a firm can harness its IC components and physical capital to generate value while *ICE* represents how the firm can harness its intellectual capital to generate value. The *ICE* also indicates the value-generating capabilities of the components of human capital and their structural capital available to them. We expect that based on the theory, intellectual capital metrics will enhance the financial performance of firms. In the extant literature, studies have found a positive nexus between intellectual capital and performance [2,3,53,64], but other studies

found an insignificant nexus [7]. Thus, we developed the two hypotheses below to reflect the expected nexus.

H1. *Value Added Intellectual Coefficient positively drives the performance of listed non-financial services firms.*

H2. *Intellectual Capital Efficiency positively drives the performance of listed non-financial services firms.*

First of all, the three components of *VAIC*, which are *HCE*, *SCE* and *CEE* have a relevant role as useful knowledge-based resources that can drive the performance of firms. Human capital is the main component of IC that builds the competitive advantage of firms [5]. It represents the experience, skills, talents and education of the employees that are used in value creation. This is the workforce that drives the operations of the businesses. Thus, the efforts to build their capacity and enhance their acumen will drive their performance, which will enhance their corporate performance. The second component, the structural capital efficiency, is derived from the structural capital, which refers to the knowledge embedded in the processes, databases, manuals, strategies and an organisational chart of firms. The third aspect is the capital employed efficiency, which is built on the capital employed, which includes the finances invested in the organization. In the extant literature, [53] and [65] found a positive significant effect of *HCE*, *SCE* and *CEE*, but it is also found that there is an insignificant effect of *SCE* and *CEE* on performance [64]. Based on the theoretical underpinnings of the study and our insights from existing studies, we developed the three hypotheses that follow.

H3. *Human Capital Efficiency positively drives the performance of listed non-financial services firms.*

H4. *Structural Capital Efficiency positively drives the performance of listed non-financial services firms.*

H5. *Capital Employed Efficiency positively drives the performance of listed non-financial services firms.*

We cannot exclude the relevant role of the few accounting metrics of the intangible assets available, and while market-based metrics are used, they can still be useful in understanding how firms drive performance. The more physical assets (asset tangibility) held by firms, the fewer intangible assets they will have [20]. Thus, in holding that intangibles augment value and performance, the tangible assets will inhibit the performance of firms. In the quest of reflecting the relevant role of the accounting metrics, we include them to complement the market-based valuation model used for the study [35]. The balance sheet record of intangibles available, which is the intangible fixed assets, is used as a proxy to explore the nexus with performance. Based on the theoretical underpinning, we expect asset tangibility to reduce performance while investment in intangible fixed assets will enhance the performance of firms. Thus, the following testable hypotheses are developed for the study.

H6. *Asset tangibility inhibits the performance of listed non-financial services firms.*

H7. *Investment in intangible fixed assets positively drives the performance of listed non-financial services firms.*

3. Methodology

This section provides an extensive description of the methodology and methods used to conduct this research and address the research questions.

3.1. Data

The study used panel data across listed non-financial firms in West Africa from 2007 to 2018. This involves a total of 59 companies from Ghana (10), Nigeria (30) and Cote d'Ivoire (19). The data were sourced from Orbis Database for the firm-specific variables. Moreover, the macroeconomic variables were sourced from the World Development Indicators of the World Bank Group. The firms included in this study operated in specific sectoral areas such as Basic Materials, Consumer Goods, Consumer Services, Industrial, Oil and Gas, Telecom/Technology, Health and Real Estate [20]. The dataset is panel data, but with some gaps, and can be described as an unbalanced panel.

3.2. Firm Performance

Performance measurement is a paramount factor in driving strategic growth and impact for firms. In the extant literature, various performance metrics have been developed to measure the performance of firms [13,53,54,65,77]. In this study, performance is measured by the return on asset, which is a ratio of the profit to the total assets of the firms. This measures the extent to which the assets of a firm generate profits. This is a conventional metric that has been used across economic, finance and accounting literature. In this study, the return on asset differs for each firm and by year. A high return on assets is associated with better firm performance and a low return on assets is tantamount to low firm performance.

3.3. The Value Added Intelectual Capital (VAIC) Model

Historically, various debates have emerged in the literature about the difficulty in measuring intellectual capital leading to different proxies used in the extant literature. The Value Added Intellectual Coefficient (*VAIC*) developed by Pulic, [21,48] provides a robust metric that can be used on audited financial statements [6]. This study uses this additive model and its specific components for measuring intellectual capital. The components of *VAIC* are *HCE*, *SCE* and *CEE*, while the additive measure of the first two components is *ICE*. This model is very useful in reflecting the overall performance of firms on their intellectual capital efforts and it is compatible for use with other ratios to draw insights for managerial decision making.

In the quest to explain the model, we define what each of the components means and how they relate to the composite measure. *HCE* indicates the value added efficiency of human capital, *SCE* indicates the value added efficiency of structural capital while *CEE* reflects the value added efficiency of capital employed. Value added (*VA*) is the contribution of the managers and their employees in creating value through their corporate activities. It is the difference between the input used and the output developed by firms. Output in this context represents revenue/sales generated by the firms, while input represents the operating costs excluding personnel expenses, which are treated as an investment. This can be presented mathematically as:

$$VA = OUTPUT - INPUT \tag{1}$$

Having obtained value added, we can express this together with human capital, structural capital and capital employed, respectively, to find the components of *VAIC*.

$$VAIC^{TM} = HCE + SCE + CEE \tag{2}$$

$$ICE = HCE + SCE \tag{3}$$

In Equations (1)–(3), *VAIC* is the additive metric, *HCE* is the ratio of value added to human capital (personnel expenses regarded as an investment), *SCE* is the ratio of structural capital (value added less human capital) to value added and *CEE* is the ratio of value added to capital employed (book value of the firm's total net assets). Moreover, there is a unique metric, Intellectual Capital efficiency (*ICE*), which focuses on the human capital and structural capital, as capital employed only complements the use of these resources [6,48,76].

The *VAIC* model has been used commonly in the literature, but this does not mean it is without criticism [78]. For instance, a study posits it is merely a measure of labour efficiency and capital investment, but not intellectual capital. Despite the challenges, there are tangible reasons it remains the best available option for providing quantitative analysis of intellectual capital [79]. For instance, it is noted that the fact that it uses audited financial statements prepared based on accounting standards means it has relevance and reliability with the benefit of comparing performance among different firms [80]. Moreover, it is a market-based approach that has useful analytic power. It is also simple, verifiable and easy to use.

3.4. Intangible Ratios

Intangible values are very difficult to measure and account for. Even the accounting standard on them, IAS 38 or the FASB comparator, only captures a few of them while ignoring significant intangible resources that drive the performance of firms. In the quest to complement the use of the *VAIC* model as a proxy for intangible value, we also add two financial ratios to measure intangible value. The first is asset tangibility, which is the ratio of fixed assets to total assets held by the firms. This should be regarded in inverse form, as the higher the asset tangibility, the lower the intangible value the firm holds. In the current context, we hypothesize a negative impact of asset tangibility on performance as intangible resources now drive a significant part of firm performance. Additionally, we use a novel metric, in line with the balance sheet-based approach, which has not been used in the extant literature because of the lack of such information in the financials of firms, especially in developing economies. This is the investment in intangible assets, measured as the ratio of intangible fixed assets to total assets in line with the extant literature [34,35]. The industrial concentrations of the firms studied require the focus on intangible values, as firms in the health and technology industries, for instance, have unique intangible assets captured on their balance sheet. The logic is that the higher this ratio, the higher the investment of the firm in intangibles. It is hypothesized that there will be a positive effect of investment in intangible assets on the performance of the firms.

3.5. Other Explanatory Variables

There are other firm-specific and macroeconomic variables that are relevant as controls that must be included in the regression equations. The firm-specific variables include firm size and financial leverage. The macroeconomic variables include human development, foreign direct investment and GDP growth.

There have been various studies that used firm size and financial leverage for analyses. Firm size is measured as the natural logarithm of total assets. Higher asset value is associated with larger firms and it is hypothesized that larger firms have some unique benefits such as economies of scale and economies of scope, which their smaller counterparts do not have. Studies such as [2,19,54,65] have used size as a control variable. Moreover, financial leverage has been measured by the ratio of debt to total assets, which depicts the proportion of debt in the capital structure of the firms. The pecking order theory explains that a highly leveraged firm with more leverage ratios will have lower profitability, which suggests a negative relationship between debt and performance. On the other hand, the trade-off theory argues for a positive relationship between debt and performance. Previous studies explored the impact of financial leverage or debt on the performance of firms [20,54].

Moreover, there are macroeconomic factors that can drive performance, which include human development, foreign direct investment and economic growth of the countries. First of all, the human development of a country is a function of both the level of education and the health of citizens [81]. It is hypothesized that high human development in countries will enhance the business climate of the countries. This will trickle down to the higher financial performance of firms as the workers will be in good health and have the acumen to do their work successfully. Thus, we expect a positive effect of human development on the performance of firms. In this study, we proxy human development with the Human Development Index, which has been used by previous studies [34,82]. Moreover, there is a huge foreign direct investment inflow within the various countries, which affects the business climate and the performance of firms. In this study, we measure foreign direct investment as a ratio of foreign direct investment to the gross domestic product. We hypothesize a positive effect of foreign direct investment on the financial performance of firms [83].

Again, economic development is measured by the gross domestic product growth of the countries. This has been used by various studies [19,20], and in this study, we hypothesise a positive effect of economic development on the performance of firms. This is because an economy with a buoyant economy will be able to create the right business climate, which will be able to enable firms to perform highly. In Table 1, we provide a description and explanation of the variables used for this study, as well as the expectation of the relationship with performance.

Table 1. Description of the Variables for the Study. (Source—Author's Conceptualisation).

Notation	Description	Meaning	Sign
ROA	Return on Asset	Ratio of Profit to Total Assets	
VAIC	Value Added Intellectual Coefficient	See Equation (2)	+
ICE	Intellectual Capital Efficiency	See Equation (3)	+
HCE	Human Capital Efficiency	Ratio of Value Added to Human Capital	+
SCE	Structural Capital Efficiency	Ratio of Structural Capital to Value Added	+
CEE	Capital Employed Efficiency	Ratio of Value Added to Capital Employed	+
TANG	Asset Tangibility	Ratio of Fixed Asset to Total Assets	-
INTAN	Intangible Investment	Ratio of Fixed Intangible Assets to Total Assets	+
SIZE	Firm Size	Natural Logarithm of Total Assets	+
DTA	Financial Leverage	Ratio of Debt to Total Assets	+/−
HDI	Human Development	Human Development Index	+
FDI_GDP	Foreign Direct Investment	Ratio of Foreign Direct Investment to Gross Domestic Product	+
GDPG (%)	Economic Growth	Gross Domestic Product Growth	+

3.6. Econometric Model

In the quest to address the specific research questions for this study, different regression models have been developed based on the different results expected. The regression technique utilized in this case is the panel-corrected standard error regression, which addresses the weaknesses of the ordinary least squares regression. Previous studies have used the panel-corrected standard error regression and have favoured it above the use of the fixed effect, random effect or have found the results consistent with that of the system generalized method of moments [4–6,84].

The mathematical depiction of the regression models is presented in Equations (4)–(11) below, which has the dependent variable (return on asset), the main explanatory variables, and the controls that are both firm-specific and macroeconomic variables. In Equations (4) and (5), the linear and quadratic equations for exploring the impact of *VAIC* are presented.

$$PERF_{i,t} = \alpha + \beta_1 VAIC_{i,t} + \beta_2 TANG_{i,t} + \beta_3 INTAN_{i,t} + \sum_{j=1}^{4} \varphi_j CON_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$PERF_{i,t} = \alpha + \beta_1 VAIC_{i,t} + \beta_2 VAIC^2{}_{i,t} + \beta_3 TANG_{i,t} + \beta_4 INTAN_{i,t} + \sum_{j=1}^{4} \varphi_j CON_{i,t} + \varepsilon_{i,t} \quad (5)$$

To further explore the unique features and the impacts, we explore the effect of *ICE*, which is an additive metric for both *HCE* and *SCE*. In Equations (6) and (7), the linear and quadratic equations for exploring the impact of *ICE* are presented.

$$PERF_{i,t} = \alpha + \beta_1 ICE_{i,t} + \beta_2 TANG_{i,t} + \beta_3 INTAN_{i,t} + \sum_{j=1}^{4} \varphi_j CON_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$PERF_{i,t} = \alpha + \beta_1 ICE_{i,t} + \beta_2 ICE^2{}_{i,t} + \beta_3 TANG_{i,t} + \beta_4 INTAN_{i,t} + \sum_{j=1}^{4} \varphi_j CON_{i,t} + \varepsilon_{i,t} \quad (7)$$

Yet again, as a way to further decompose the impact and explore the specific drivers of performance, we use the specific additive components of *VAIC*. This is presented in Equation (8) as a linear model to explore the specific effects.

$$PERF_{i,t} = \alpha + +\delta_1 HCE_{i,t} + \delta_2 SCE_{i,t} + \delta_3 CEE_{i,t} + \delta_4 TANG_{i,t} + \delta_5 INTAN_{i,t} + \sum_{j=1}^{4} \lambda_j CON_{i,t} + \varepsilon_{i,t} \quad (8)$$

Finally, to explore the possible quadratic nexus for the components of *VAIC*, we model Equations (9)–(11) to reflect the quadratic effect for *HCE*, *SCE* and *CEE*, distinctively.

$$PERF_{i,t} = \alpha + \delta_1 HCE_{i,t} + \delta_2 HCE^2{}_{i,t} + \delta_3 TANG_{i,t} + \delta_4 INTAN_{i,t} + \sum_{j=1}^{4} \lambda_j CON_{i,t} + \varepsilon_{i,t} \quad (9)$$

$$PERF_{i,t} = \alpha + \delta_1 SCE_{i,t} + \delta_2 SCE^2{}_{i,t} + \delta_3 TANG_{i,t} + \delta_4 INTAN_{i,t} + \sum_{j=1}^{4} \lambda_j CON_{i,t} + \varepsilon_{i,t} \quad (10)$$

$$PERF_{i,t} = \alpha + \delta_1 CEE_{i,t} + \delta_2 CEE^2{}_{i,t} + \delta_3 TANG_{i,t} + \delta_4 INTAN_{i,t} + \sum_{j=1}^{4} \lambda_j CON_{i,t} + \varepsilon_{i,t} \quad (11)$$

In Equations (4)–(11), *PERF* represents profitability measured by return on asset, *VAIC* represents the Value Added Intellectual Coefficient; *ICE* represents Intellectual Capital Efficiency; *HCE* represents the Human Capital Efficiency; *SCE* represents Structural Capital Efficiency, *CEE* represents the Capital Employed Efficiency, *TANG* represents asset tangibility and *INTAN* represents investments in intangible fixed assets. *CON* is a vector of four control variables, which comprise firm size, the ratio of debt to total assets, human development index, foreign direct investment to GDP ratio and GDP per capita. The last three variables are country-specific while all others are firm-specific. Each of the variables differs for firm i and year t. In addition, α is the constant variable; β and δ are the regression coefficients of the independent variables; φ and λ are regression coefficients of the control variables while ε is the error term.

4. Results

The results of the study are discussed critically in the following sections. This includes the preliminary descriptive analyses and regression results. The findings are discussed vis-à-vis the hypothesized relationships and the extant literature.

4.1. Descriptive Statistics

The descriptive statistics of the variables used for the study are presented in Table 2, including the firm-level and macroeconomic variables.

The findings show that the average return on assets is 9.1%, which varies by year, firm and country. The result also shows that the average *VAIC* is 6.1, which is decomposed into an average *ICE* of 5.36, an average *HCE* of 4.72, an average *SCE* of 0.64 and an average *CEE* of 0.74. This shows that the *HCE* is the highest component of *VAIC* followed by *CEE* and

SCE. The result further reveals that the average TANG is 48%, which is the total proportion of tangible assets (property, plant and equipment) held by the firms. In addition, the average INTAN is 2.2%, which is the total proportion of intangible assets (as per accounting reporting standards) held by the firms in their asset structure. The study also reveals that the average DTA is 70.4%, which reveals the portion of the debt that forms the capital structure of the firms. This reveals the extent to which the firms adopt debt as a component of their assets. As regards the macroeconomic variables, the study shows that the average Human Development Index of the countries studied is 0.511, the average ratio of Foreign Direct Investment to Gross Domestic Product is 2.17% and the average GDP growth is 5.03%. Moreover, the average total asset of the firms is USD 220,949 and the average equity position is USD 103,045.

Table 2. Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	452	0.091	0.111	−0.434	0.570
VAIC	452	6.101	7.262	−18.946	58.800
ICE	452	5.357	7.050	−18.95	57.961
HCE	452	4.722	6.933	−20.000	56.978
SCE	452	0.636	0.429	−1.670	5.136
CEE	452	0.744	1.644	−6.279	23.882
TANG	452	0.479	0.235	0.034	0.974
TANG (US $)	452	146,428.88	550,779.79	56.000	4,995,382
INTAN	452	0.022	0.064	0.000	0.536
INTAN (US $)	452	11,866.434	56,987.829	0.000	577,377
DTA	452	0.704	1.177	0.046	17.295
HDI	452	0.511	0.036	0.455	0.606
FDI_GDP (%)	452	2.167	2.138	0.503	9.467
GDPG (%)	452	5.033	3.891	−4.387	14.047
ASSETS (US $)	452	220,948.8	671,757.35	605	5,803,398
EQUITY (US $)	452	103,044.93	375,589.37	−33,346	3,544,415

Notes—ROA represents the return on assets; *VAIC* represents value added intellectual coefficient; *ICE* represents intellectual capital efficiency; *HCE* represents human capital efficiency; *SCE* represents structural capital efficiency; *CEE* represents capital employed efficiency; TANG represents asset tangibility measured as the ratio of fixed assets (property plant and equipment (PPE)) to total assets; INTAN represents intangibility, which is the ratio of intangible fixed assets (based on accounting principles) to total assets; DTA represents the ratio of debt to total assets; HDI is the human development index, which is a macro-level measure; FDI_GDP is the ratio of foreign direct investment to gross domestic product; and GDPG is the gross domestic product growth. In addition, the nominal values of some of the variables, total assets and total equity have been provided. The nominal values have not been used in the regression, only the standardized/ratios have been used. (**Source**—Author's Computations in STATA16).

4.2. Milticollinearity and Correlation Tests

As a means to avoid the problems of multicollinearity, which can affect the veracity of the analysis, we proceeded to conduct a multicollinearity test using the variance inflation factor (VIF) test.

In addition, we conducted a correlation analysis to understand the variables we are using more and assess if some variables need to be dropped or not. In the extant literature, it is argued that a correlation coefficient less than 0.7 suggests that multicollinearity is not likely to be a problem [85]. The results in Table 3 show that the highest correlation coefficient is 0.66, which is lower than the rule of thumb. Moreover, it is argued that a VIF that is less than 10 shows that multicollinearity is not a problem [86]. The results further show that the highest VIF is 1.82, which is lower than the rule of thumb. Based on this, we proceed to use all the variables as explanatory variables in the analysis.

Table 3. Pairwise Correlations and Variance Inflation Factor.

Variables	**VIF**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
(1) *HCE*	1.14	1.000				
(2) *SCE*	1.13	0.243 ***	1.000			
(3) *CEE*	1.03	0.016	0.013	1.000		
(4) TANG	1.22	0.177 ***	0.185 ***	−0.016	1.000	
(5) INTAN	1.13	0.001	0.061	−0.134 ***	0.095 **	1.000
(6) SIZE	1.16	0.060	0.032	0.029	0.066	0.074 *
(7) DTA	1.13	−0.215 ***	0.068	−0.023	−0.121 ***	−0.016
(8) HDI	1.82	0.069	0.138 ***	−0.028	0.206 ***	0.120 ***
(9) FDI_GDP	1.75	0.015	0.121 ***	−0.002	0.032	0.105 ***
(10) GDPG	1.11	−0.027	−0.001	0.026	−0.075 *	0.027
Variables	VIF	(6)	(7)	(8)	(9)	(10)
(1) *HCE*	1.14					
(2) *SCE*	1.13					
(3) *CEE*	1.03					
(4) TANG	1.22					
(5) INTAN	1.13					
(6) SIZE	1.16	1.000				
(7) DTA	1.13	−0.221 ***	1.000			
(8) HDI	1.82	−0.044	−0.099 **	1.000		
(9) FDI_GDP	1.75	−0.070 *	−0.042	0.659 ***	1.000	
(10) GDPG	1.11	0.036	−0.107 ***	0.077 *	0.289 ***	1.000

Notes—*HCE* represents human capital efficiency; *SCE* represents structural capital efficiency; *CEE* represents capital employed efficiency; TANG represents asset tangibility measured as the ratio of fixed assets (property plant and equipment (PPE)) to total assets; INTAN represents intangibility, which is the ratio of intangible fixed assets (based on accounting principles) to total assets; DTA represents the ratio of debt to total assets; HDI is the human development index, which is a macro-level measure; FDI_GDP is the ratio of foreign direct investment to gross domestic product; and GDPG is the gross domestic product growth. In addition, VIF represents the variance inflation factor. For separate regressions with other additive variables (*VAIC* or *ICE*), the VIF is still low. Also, "***" represents $p < 0.01$, "**" represents $p < 0.05$, and "*" represents $p < 0.1$. (**Source**—Author's Computations in STATA16).

4.3. Regression Analysis and Discussions

The study proceeds to conduct an extensive regression analysis to address the research questions. In doing this, the return on assets is regressed on the firm-specific variables and the macroeconomic variables. Generally, the model is statistically significant as evident by the Wald Chi-Squared (χ^2). We proceed to analyse the results under three sections: the composite intellectual capital metric, the components and some results for the country-specific cases.

4.3.1. IC, Intangibles and Performance of Firms—Composite Metrics

First of all, we provide an analysis of the results by focusing on the composite intellectual capital measures, the *VAIC* and *ICE* as per the findings reported in Table 4.

The results show that *VAIC* has a positive and significant effect on return on assets. This suggests that intellectual capital enhances the performance of the firms. Moreover, the study explores the nature of the relationship and found that it has an inverted U-shaped link as evidenced by the negative significant result found for the *VAIC* squared variable. To further explore the intellectual capital metric and the nature of the impact, the *ICE* has been used. The results show that *ICE* has a positive significant effect on the performance of the firms examined. This means that both human capital efficiency and structural capital efficiency are critical drivers of the profitability of listed non-financial services firms. The findings further reveal that the nature of the nexus is curvilinear in the form of an inverted U-shape as evidenced by the negative significant effect found for the *ICE* squared variable. These findings are in tandem with *H1–H2*, which is in line with the findings of [2,3,53,64]. However, it is found that intellectual capital did not drive the return on assets of listed non-financial services firms in Ghana [7].

The study further explored the effect of some firm-level variables on performance. The findings show that consistently, asset tangibility has a negative significant effect on the performance of firms. This suggests that investments in fixed assets, especially in this current knowledge-based context inhibit profitability. Thus, although firms will still need to invest in fixed assets, excessive investment in these tangible resources will reduce performance as tangible assets are not core anymore in driving value creation. This finding is in line with the results of [4]. Moreover, the study found that although investment in intangible fixed assets has a positive effect on performance, it is not statistically significant. This is key as the type of firms under study are non-financial services firms, which have to focus to some extent on property, plant and equipment. Moreover, the assets captured in these variables are not as comprehensive as the accounting standard records, only goodwill, patents, licenses and other intangible assets are covered as per the IAS 38: Intangible Assets. The IAS 38 ignores various intangible resources that drive the performance of firms, such as production infrastructure, production processes, formulas, databases and designs [34].

Table 4. Impact of Intellectual Capital and Intangibles on Performance.

Variables	**(1) ROA**	**(2) ROA**	**(3) ROA**	**(4) ROA**
VAIC	0.003 ***	0.011 ***		
	(0.001)	(0.002)		
VAIC × *VAIC*		-1.81×10^{-4} ***		
		(3.94×10^{-5})		
ICE			0.003 ***	0.012 ***
			(0.001)	(0.002)
ICE × *ICE*				-2.1×10^{-4} ***
				(4.19×10^{-5})
TANG	−0.083 ***	−0.102 ***	−0.084 ***	−0.107 ***
	(0.022)	(0.022)	(0.022)	(0.022)
INTAN	0.092	0.077	0.104	0.105
	(0.065)	(0.069)	(0.065)	(0.065)
SIZE	0.016 ***	0.013 ***	0.015 ***	0.013 ***
	(0.003)	(0.003)	(0.003)	(0.003)
DTA	−0.008 *	2.08×10^{-4}	−0.008 *	0.001
	(0.005)	(0.005)	(0.004)	(0.004)
HDI	−0.291	−0.296	−0.300	−0.323 *
	(0.188)	(0.183)	(0.188)	(0.182)
FDI_GDP	0.008 **	0.008 ***	0.008 **	0.008 ***
	(0.003)	(0.003)	(0.003)	(0.003)
GDPG	0.002 *	0.002	0.003 *	0.002 *
	(0.001)	(0.001)	(0.001)	(0.001)
_cons	0.068	0.069	0.077	0.089
	(0.102)	(0.099)	(0.103)	(0.098)
Observations	452	452	452	452
Firms	59	59	59	59
Countries	3	3	3	3
R-squared	0.173	0.215	0.173	0.223
Wald (χ^2)	107.04 ***	137.68 ***	107.13 ***	147.12 ***

Notes—Standard errors are in parenthesis; while "***" represents $p < 0.01$, "**" represents $p < 0.05$, and "*" represents $p < 0.1$. (**Source**—Author's Computations in STATA16).

The study also found that firm size and financial leverage are critical factors driving performance. Firm size has a positive significant effect on the performance of the firms. This means that larger firms are more profitable than the smaller forms. This could be explained by the competitive advantage that large firms have in taking advantage of economies of scale, and economies of scope. This is evident in other studies that found a positive impact of size on firm performance [2]. Again, the study found that the debt to asset ratio has a negative significant effect on the performance of firms. This suggests that high debt in the capital structure of firms impedes their performance. One explanation is that high debt will encourage managers to take on more risk, which, if not taken well, will affect performance. Moreover, there are interest charges and various obligations associated with debt payment, which can affect the operations of the firms. This finding is also in line with the pecking order theory, but not the trade-off theory.

The impact of macroeconomic variables such as human development, foreign direct investment and economic growth were also explored. The study found that human development has a negative effect on the performance of firms. This is contrary to our expectation that a high level of education and a healthier nation should have firms that perform well as managers apply their knowledge while in good health. This result is, however, statistically weak and insignificant in some cases. Moreover, the foreign direct investment inflow into the countries drives the performance of firms. This is very interesting as we continue to find foreigners investing within the economies of Ghana, Nigeria and Cote D'Ivoire. The inflow of FDI positively affects different aspects of the economy, which yields positive results and business successes [84]. The study also reveals that economic growth as measured by GDP growth drives the performance of firms [19,20,34].

4.3.2. IC, Intangibles and Performance of Firms—Components

The previous regression analysis provides an in toto understanding of the nexus, but these regression results show the impact of the components of *VAIC* on performance.

The findings in Table 5 reveal that human capital efficiency has a positive and significant effect on the performance of firms. This means that high human capital efficiency increases the performance of firms. Moreover, the result shows that this positive effect is evident both in the short-run and negative in the long-run, meaning there is a curvilinear relationship. This finding is in line with *H3*, which is in tandem with the human capital theory. The findings reveal how vital the employees, their acumen and their capabilities are essential to driving the performance of the firms. In the literature, various studies also found a positive impact on performance [2,3,53]. Moreover, the evidence of an inverted U-shaped relationship shows that firms may reach a point of diminishing returns as they invest more in human capital. This finding reveals that firms need to be conscious about ensuring that investments in human capital are monitored to achieve optimal results so as not to lead to slacks or inefficiency.

The study also found that structural capital efficiency has a positive and significant effect on the performance of firms. This means that enhanced structural capital enhances the performance of firms. In the lure of exploring the curvilinear nexus, it is evident that there is an inverted U-shaped relationship. This means that while enhanced structural capital efficiency can drive performance, there is a level at which excessive changes in systems and processes will reduce performance. This is evident by the negative significant link between *SCE* squared and return on asset. In the literature [3,53], studies found positive impacts of *SCE* on performance but others found an insignificant impact [64].

Table 5. Impact of Intellectual Capital Components and Intangibles on Performance.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA
HCE	0.002 ***	0.003 ***	0.012 ***				
	(0.001)	(0.001)	(0.002)				
HCE × *HCE*			-2.08×10^{-4} ***				
			(4.29×10^{-5})				
SCE	0.039 **			0.048 ***	0.112 ***		
	(0.015)			(0.018)	(0.021)		
SCE × *SCE*					−0.021 ***		
					(0.005)		
CEE	0.001					0.001	0.008
	(0.004)					(0.004)	(0.006)
CEE × *CEE*							-4.36×10^{-4}
							(4.28×10^{-4})
TANG	−0.093 ***	−0.083 ***	−0.104 ***	−0.08 5***	−0.090 ***	−0.069 ***	−0.067 ***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
INTAN	0.093	0.105	0.107	0.085	0.069	0.087	0.085
	(0.068)	(0.065)	(0.065)	(0.065)	(0.065)	(0.070)	(0.070)
SIZE	0.015 ***	0.015 ***	0.013 ***	0.015 ***	0.013 ***	0.016 ***	0.015 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
DTA	−0.01 **	−0.008 *	0.002	−0.013 ***	−0.014 ***	−0.012 **	−0.011 **
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
HDI	−0.318 *	−0.298	−0.317 *	−0.321*	−0.261	−0.286	−0.278
	(0.187)	(0.189)	(0.183)	(0.189)	(0.187)	(0.191)	(0.191)
FDI_GDP	0.007 **	0.008 **	0.009 ***	0.007 **	0.007 **	0.008 **	0.007 **
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
GDPG	0.003 *	0.003 *	0.002 *	0.002 *	0.002	0.002 *	0.002 *
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
_cons	0.076	0.077	0.089	0.083	0.050	0.078	0.077
	(0.102)	(0.103)	(0.099)	(0.103)	(0.102)	(0.104)	(0.104)
Observations	452	452	452	452	452	452	452
Firms	59	59	59	59	59	59	59
Countries	3	3	3	3	3	3	3
R-squared	0.190	0.170	0.216	0.170	0.209	0.139	0.143
Wald (χ^2)	119.34 ***	105.94 ***	144.50 ***	92.98 ***	117.74 ***	75.74 ***	77.08 ***

Notes—Standard errors are in parenthesis; while "***" represents $p < 0.01$, "**" represents $p < 0.05$, and "*" represents $p < 0.1$. (**Source**—Author's Computations in STATA16).

The effectiveness of both *HCE* and *SCE* has to be within the context where *CEE* thrives. We explore the impact of *CEE* on the performance of the firms. The results show that overall, there is a positive and insignificant effect of *CEE* on performance. This means that in the non-financial services firms, their capital employed efficiency is not a driver of their performance. This result is in tandem with the findings of some studies [2,3,53,65] where there is a positive impact of *SCE* on performance but, others found an insignificant impact [64].

We observe that the impact of asset tangibility, intangible assets, size, financial leverage, human development, foreign direct investment and economic growth are consistent with results discussed earlier in the previous section. Most essentially, while we provide an overall picture of the firms listed in Ghana, Nigeria and Cote D'Ivoire, there is the possibility of differences in how intellectual capital affects performance. As a way to clarify this, the next section disaggregates the analysis under the three countries.

4.3.3. IC, Intangibles and Performance of Firms—Country Specifics

There are country-specific differences in how intellectual capital or intangible investments impact the performance of firms. In the following results presented in Tables 6–8, the findings for Ghana, Nigeria and Cote D'Ivoire are evident, respectively.

Table 6. Impact of Intellectual Capital, Intangibles and Its Components on Performance—Ghana.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA
VAIC	0.003 **	0.017 ***			
	(0.001)	(0.005)			
VAIC × *VAIC*		-2.39×10^{-4} ***			
		(7.24×10^{-5})			
ICE			0.003 ***	0.013 ***	
			(0.001)	(0.004)	
ICE × *ICE*				-1.78×10^{-4} **	
				(6.92×10^{-5})	
HCE					0.002 ***
					(0.001)
SCE					0.033 ***
					(0.008)
CEE			0.043 ***		0.047 ***
			(0.015)		(0.017)
TANG	−0.057	0.024	−0.048	−0.007	−0.067
	(0.065)	(0.066)	(0.066)	(0.067)	(0.064)
INTAN	0.546 ***	0.183	−0.221	0.478 ***	−0.200
	(0.127)	(0.163)	(0.318)	(0.119)	(0.333)
SIZE	0.037 ***	0.025 ***	0.044 ***	0.028 ***	0.056 ***
	(0.008)	(0.008)	(0.010)	(0.008)	(0.010)
DTA	−0.414 ***	−0.362 ***	−0.401 ***	−0.382 ***	−0.426 ***
	(0.047)	(0.047)	(0.044)	(0.046)	(0.044)
_cons	−0.075	−0.080	−0.174 *	−0.056	−0.306 ***
	(0.091)	(0.084)	(0.106)	(0.086)	(0.112)
Observations	61	61	61	61	61
Firms	10	10	10	10	10
R-squared	0.617	0.668	0.671	0.636	0.709
Wald (χ^2)	104.04 ***	239.52 ***	119.75 ***	229.61 ***	181.88 ***

Notes—Standard errors are in parenthesis; while "***" represents $p < 0.01$, "**" represents $p < 0.05$, and "*" represents $p < 0.1$. (**Source**—Author's Computations in STATA16)

As regards the findings for the Ghanaian context, the results in Table 6 show intellectual capital enhances the performance of listed non-financial services firms, which is in line with *H1* to *H7*, except *H6*. The findings show that the compositive measures of intellectual capital, *VAIC* and *ICE* enhance the performance of firms. However, there is an inverted U-shaped relationship as evidenced by the negative significant effect of the quadratic term in the quadratic equations. The study also found that the components of *VAIC*, which include human capital efficiency, structural capital efficiency and capital employed efficiency all have a positive significant effect on the performance of the listed firms in Ghana. These results show the vital role that intellectual capital plays in the Ghanaian context.

The finding also shows that asset tangibility has an insignificant impact on performance, while intangible investment rather drives performance significantly to some extent. The study also reveals that firm size has a positive significant effect on the performance of listed non-financial services firms, while financial leverage has a negative significant effect. This means that large firms have higher performance as a possible result of economies of scale and economies of scope. Moreover, highly leveraged firms are less profitable as compared to firms with lower debt, which is in line with the pecking order theory but not the trade-off theory.

Table 7. Impact of Intellectual Capital, Intangibles and Its Components on Performance—Nigeria.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA
VAIC	0.001 *	0.004 **			
	(0.001)	(0.002)			
VAIC × *VAIC*		-6.73×10^{-5} *			
		(4.05×10^{-5})			
ICE			0.001	0.003 *	
			(0.001)	(0.002)	
ICE × *ICE*				5.55×10^{-5}	
				(4.26×10^{-5})	
HCE					0.001
					(0.001)
SCE					0.027 *
					(0.015)
CEE			0.009		0.009
			(0.006)		(0.006)
TANG	−0.077 ***	−0.086 ***	−0.070***	−0.087 ***	−0.074 ***
	(0.025)	(0.026)	(0.026)	(0.027)	(0.027)
INTAN	−0.033	−0.015	−0.027	−0.022	−0.028
	(0.083)	(0.083)	(0.082)	(0.084)	(0.082)
SIZE	0.020 ***	0.019 ***	0.020 ***	0.020 ***	0.019 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
DTA	−0.103 ***	−0.096 ***	−0.106 ***	−0.098 ***	−0.104 ***
	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)
_cons	−0.031	−0.029	−0.030	−0.028	−0.035
	(0.033)	(0.032)	(0.032)	(0.033)	(0.032)
Observations	207	207	207	207	207
Firms	30	30	30	30	30
R-squared	0.355	0.363	0.362	0.358	0.367
Wald (χ^2)	143.59 ***	157.11 ***	150.98 ***	150.94 ***	145.64 ***

Notes—Standard errors are in parenthesis; while "***" represents $p < 0.01$, "**" represents $p < 0.05$, and "*" represents $p < 0.1$. (**Source**—Author's Computations in STATA16).

We also explore the results for the case of Nigerian firms under study. The results in Table 7 reveal that *VAIC* has a positive significant effect on the performance of the listed firms. This shows that intellectual capital drives performance. The study also shows that there is a negative significant effect of the quadratic variable for *VAIC* on the performance of firms. This reveals that there is an inverted U-shaped relationship between *VAIC* and firm performance. As regards *ICE*, there is a positive effect on performance but there is no curvilinear relationship. In the component model, the result shows that only *SCE* has a positive significant effect on the performance of listed non-financial services firms in Nigeria. Both *HCE* and *CEE* have a statistically insignificant positive impact on performance. The findings are only in line with *H1*, *H2*, *H4* and *H6*, respectively.

As regards the control variables, the results show that asset tangibility has a negative significant effect on performance. This means that firms with high investment in the tangible assets have low performance. Investment in intangible assets does not have a significant effect on the performance of firms. Moreover, firm size has a positive significant effect on performance, which shows that larger firms perform better than smaller firms. The result also shows a negative significant effect of financial leverage on the performance of firms in Nigeria.

Table 8. Impact of IC, Intangibles and Its Components on Performance—Cote D'Ivoire.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA
VAIC	0.006 **	0.023 ***			
	(0.003)	(0.004)			
VAIC × *VAIC*		−0.001 ***			
		(1.19×10^{-4})			
ICE			0.008 **	0.027 ***	
			(0.003)	(0.005)	
ICE × *ICE*				−0.001 ***	
				(1.28×10^{-4})	
HCE					0.004
					(0.004)
SCE					0.130 ***
					(0.042)
CEE			0.002		0.001
			(0.006)		(0.006)
TANG	−0.204 ***	−0.197 ***	−0.199 ***	−0.181 ***	−0.216 ***
	(0.050)	(0.042)	(0.052)	(0.040)	(0.051)
INTAN	1.184 ***	1.196 ***	1.148 ***	1.071 ***	1.053 ***
	(0.354)	(0.327)	(0.353)	(0.316)	(0.340)
SIZE	0.008	3.95×10^{-4}	0.007	0.002	0.004
	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
DTA	−0.001	0.018 **	-7.45×10^{-5}	0.023 ***	−0.010
	(0.005)	(0.008)	(0.005)	(0.008)	(0.007)
_cons	0.028	0.043	0.027	0.016	0.032
	(0.088)	(0.078)	(0.089)	(0.077)	(0.088)
Observations	184	184	184	184	184
Firms	19	19	19	19	19
R-squared	0.179	0.299	0.187	0.331	0.245
Wald (χ^2)	31.74 ***	63.48 ***	33.13 ***	71.48 ***	53.71 ***

Notes—Standard errors are in parenthesis; while "***" represents $p < 0.01$, and "**" represents $p < 0.05$. (**Source**—Author's Computations in STATA16).

The third part of the country-specific analysis is focused on the Cote D'Ivoire. The findings presented in Table 8 show that *VAIC* has a positive significant effect on the performance of listed non-financial services firms. This is further explored to reveal the curvilinear nature of nexus. The findings reveal that there is an inverted U-shaped relationship between *VAIC* and performance. This is evident by the negative significant effect evidence for *VAIC* squared. Additionally, the result shows that *ICE* has a positive significant effect on performance and the nexus is in the form of an inverted U-shape. This means that *ICE* enhances performance but this diminishes at some level. As regards the specific components of *VAIC*, only *SCE* has a positive significant effect on performance while the *HCE* and *CEE* do not have a significant effect on performance. The findings are in line with *H1* to *H7* except for *H3* and *H5*.

The study further reveals that asset tangibility has a negative significant effect on the performance of firms in Cote D'Ivoire. However, investment in intangible assets has a positive significant effect on the performance of listed non-financial services firms. This means that firms with high investment in intangibles that operate in Cote D'Ivoire have higher performance. The results also reveal that firm size does not drive performance, while financial leverage has a positive significant effect on performance. This means that firms with high debt in their capital structure, operating in Cote D'Ivoire tend to have higher performance.

5. Implications for Policy, Practice and Future Research

The findings of this study have threefold implications, specifically for practice, policy and future research.

Practice-wise, the insights of the study are useful for C-suite executives of non-financial services firms, the board of directors and practitioners who consult for these firms. Essentially, the results reveal how intellectual capital and intangible value should be of focus in managerial strategic stances in the quest to enhance performance. Discussing these findings in the current content of the COVID-19 pandemic and aftermath, there will be the need for a heightened focus on intangible values that firms generate to drive performance. With these knowledge-based resources, there should be a focus on building more human capital and structural capital while using the relevant capital employed to complement such investments. The pandemic has accelerated the use of more knowledge-based resources, as most firms have to rely on remote working and various tech tools to execute their business activities. Managers should be focused on creating, measuring, monitoring and managing their intellectual capital and intangible resources while they leverage them to enhance performance. There should also be the use of financial metrics of assessment that focus on intellectual capital. The corporate boards also have to support managers in their quest to drive performance by strategically positioning their firms to develop intellectual capital and invest in intangible resources that can give them both competitive and transient advantages.

In addition, the findings of the study have implications for policy across the West African context. First, the findings reveal that for the regulators of the listed firms (including the Securities and Exchange Commissions and the Stock Exchanges), there should be some efforts to enhance the valuation of businesses and their stocks even when their financial accounts ignore their intellectual and intangible resources. There is a lot of effort that needs to emanate from industry associations for non-financial services firms in a way to develop a framework that can help their members to develop, monitor and measure their intellectual resources while using them to enhance performance. In the current context of the pandemic, there should be deliberate efforts by firms to maintain their human capital and ensure they drive the growth they want. This can be achieved by focusing on educating their staff, increasing capacity building, as well as further training and supporting them with the relevant tools and techniques to execute their work effectively and efficiently. This can also be possible with the provision of the relevant tech tools and technological resources to help the workers to increase revenues while reducing their costs. Moreover, the fact that structural capital is key to driving performance means that firms should aim to invest in developing processes, corporate policies, new technologies and internal controls that aid employees to work effectively and efficiently. There is a signal that Ghanaian firms benefit more from investment in intangibles, followed by Cote D'Ivoire, but Nigerian firms do not seem to be benefiting enough. Policymakers should be concerned with creating a business climate that supports investment in intellectual capital and the ability of businesses to enhance their bottom line with it. Policymakers should continue to leverage economic development and foreign direct investment in enhancing performance. There should also be a focus on helping the industries to leverage the human development investments of their countries in supporting their business operations, vision and mission.

The study provides clarity on the specific research questions under investigation, yet there are some other areas that future researchers can explore. Considering the new normal created by the COVID-19 pandemic, future researchers should explore whether the pandemic made firms invest more in intellectual capital or intangible assets, and the impact on profitability, efficiency and productivity. Moreover, other studies should explore the unique intellectual capital disclosures made during the period of the pandemic as well as understand the institutional drivers using the institutional theory. Other studies can adopt the other approaches of measuring intellectual capital, especially in the market-based models, with new data or in the emerging market context.

Researchers can also explore how intellectual capital influences climate action within the financial services sector. Future studies can also explore the theoretical factors that drive the unique country-specific disparities in the intellectual capital–performance nexus using a combination of research approaches including qualitative and quantitative research approaches. This will be vital in the quest for theory construction and obtaining deeper knowledge about the why and how of the specific issues within the financial sectors of the countries.

6. Conclusions

There is a new ecosystem created by the high investment in intangibles across the world. However, the accounting standard, IAS 38, and the various managerial tools available today are not able to accurately measure intellectual assets to be able to explore how they affect the performance of firms. Moreover, studies conducted in the past tend to focus on the developed world and the banking sector where data are available, creating a gap in the literature for the emerging markets. The study of intellectual capital can be situated within the human resource management literature as it covers critical issues such as skills and knowledge management, as well as the internal policies and processes that fall under their remit. The study, therefore, brings a financial perspective to the work of the human resource managers and how they are relevant to driving organisational performance. Using a dataset of listed firms that operated in three West African countries (Ghana, Nigeria and Cote D'Ivoire), over the period 2007 to 2018, this study explores how intellectual capital and intangible assets affect the performance of listed non-financial services firms. The study used a dataset of 59 firms over the period using an unbalanced panel data analysis conducted with the panel-corrected standard error regression, which accounts for heteroskedasticity. To explore the different dynamics, the analysis capture how intellectual capital is measured by the composite measures used in the literature (*VAIC* and *ICE*), the three main additive components, and intangible ratios that affect performance. The results show the differences in how intellectual capital variables affect the performance of firms, showing the variability in how the knowledge-based theory can be applied to the developing economy context. The results show that resource-based theory applies to the countries under study, but the extent to which specific intellectual capital components affect performance can differ. Moreover, given that intellectual capital is a knowledge resource, the findings show that knowledge-based resources drive performance, but there are disparities among countries.

The results show that intellectual capital measured by *VAIC* has a positive significant effect on performance, which is linear in all situations. There is no evidence of a curvilinear relationship. Moreover, *ICE* has a positive significant effect on performance with no curvilinear nexus. In the quest to explore the components of *VAIC* that are driving the linkages, the study found that *HCE* has a positive significant effect on performance without any feature of a curvilinear nexus in the quadratic model. However, *SCE* has a positive significant effect in the linear model, but in the case of the quadratic model, there is evidence of an inverted U-shaped relationship with performance. This suggests that while structural capital enhances performance initially, at some stage, it inhibits the performance of firms. The study found no statistically significant impact of capital employed efficiency on the performance of the listed firms in the linear and the quadratic model. The study also found that asset tangibility inhibits the performance of firms, while investments in intangible assets have a positive but insignificant effect on the performance of firms.

In pursuit of further exploring the country-specific linkages, we study the nexus while excluding the macroeconomic controls. The results show that for the specific country contexts, intellectual capital drives performance significantly in Ghana followed by Cote D'Ivoire and then Nigeria. Specifically, all the intellectual capital metrics and intangible value measures have a positive significant effect on performance in Ghana. Investment in intangibles drives performance, but asset tangibility does not significantly inhibit the

performance of firms in Ghana. In addition, it is evident that for Cote D'Ivoire, intellectual capital has an inverted U-shaped relationship with performance. Moreover, *SCE* has a positive significant effect on performance, but both *HCE* and *CEE* do not drive performance. The result also shows that asset tangibility inhibits performance while investment in intangibles drives the performance of firms. In Nigeria, there is evidence of some level of an inverted U-shaped nexus between intellectual capital and performance, albeit weak. Moreover, only *SCE* drives performance, while *HCE* and *CEE* do not significantly affect performance. Although asset tangibility is found to inhibit performance, investment in intangibles does not impact performance.

As regards the control variables, the study shows that size has a positive impact on performance except for the case of Cote D'Ivoire. Moreover, Financial leverage negatively impacts performance, suggesting that high debt in the capital structure inhibits performance, which is in line with the trade-off theory. The study also reveals that contrary to our expectations, human development has a negative impact on performance, while both foreign direct investment and economic growth enhance the performance of firms.

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