

# IMPACT OF INTELLECTUAL CAPITAL ON FIRMS' PROFITABILITY: EMPIRICAL EVIDENCE FROM INDUSTRIALS SECTOR IN SRI LANKA

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## ABSTRACT

This study aims to explore the impact of intellectual capital on the firms' profitability of the listed industrials sector in Sri Lanka. The data comprises 155-firm-year observations of 31 companies listed under the industrials sector in the Colombo Stock Exchange for the five years from 2018 to 2022. The industrials sector consists of the listed companies under the capital goods, commercial & professional services and transportation sectors. Modified Value-Added Intellectual Coefficient has been employed to measure the intellectual capital together with the value creation efficiencies of capital employed, human capital, structural capital and relational capital of listed firms. This study used return on equity, operating profit to assets ratio, and gross profit to assets ratio as a signal of the presence of firms' profitability. The researchers used Pearson's correlation and panel data regression to investigate the impact of intellectual capital on firms' profitability. The results reveal that capital employed efficiency and human capital efficiency positively affect the firms' profitability of listed companies in the industrials sector. However, structural capital efficiency and relational capital efficiency have not significantly impacted the firms' profitability. The findings of this study are highly relevant for decision-makers, as they demonstrate the crucial role of intellectual capital in value creation. The results indicate that intellectual capital is a key driver of firms' profitability, especially for industrials sector firms in developing economies. Therefore, governments and corporations in developing economies should prioritize investments in developing intellectual capital to enhance firms' profitability and promote economic growth. It makes significant contributions by considering interaction variables and seeking consistency in results across different political regimes.

***Keywords: Capital employed efficiency, Human capital efficiency, Relational capital efficiency, Structural capital efficiency***

***JEL Classification: O3***

## 2.1 INTRODUCTION

In modern business, Intellectual Capital (IC) plays a vital role in developing corporate value and maintaining competitive advantages. Over the past ten years, academics have shown great interest in IC, particularly as the world increasingly focuses on the knowledge-based economy. According to Serenko and Bontis (2013), a company's IC is one of the essential elements of success. By providing accurate and comprehensive IC information, businesses can bridge the information gap between management and shareholders, reducing agency problems.

The importance of IC has increased with the growth of knowledge-based, fast-changing, and technologically advanced companies in the world economy (Petty & Guthrie, 2000; Canibano *et al.*, 2000). In this dynamic economy, both tangible and intangible resources are seen as potential sources of strategic advantage (Ruta, 2009). According to the resource-based theory, an organization's resources are unique and cannot be duplicated (Marr *et al.*, 2003). In recent times, the theory has garnered interest in fields such as strategic management, economics and accounting, owing to the clear link between intangible resources and performance metrics. The theory encompasses both tangible and intangible assets.

The concept of IC is relatively new but crucial for securing a competitive edge and achieving superior performance through value generation (Marr *et al.*, 2003; Clarke *et al.*, 2011). As such, firms must understand, identify, develop, and utilize IC efficiently to gain a competitive advantage. Developed countries have recognized the importance of IC in the value-creation process, making it feasible to measure and report it. Unfortunately, limited research has been conducted in emerging economies like Sri Lanka on this topic.

Companies are still surviving in today's environment, which is defined by fierce rivalry brought about by globalization and the introduction of new information and communication technologies. The golden rule of globalization dictates that businesses must be highly competitive to succeed in an environment where they face numerous competitors. A combination of tangible and intangible resources, such as IC, is necessary to develop such a characteristic (Bchini, 2015; Massingham & Tam, 2015). Intangible resources, also known as knowledge assets, are currently the most important economic resource and play a crucial role in enhancing financial and organizational performance (Dalwai & Salehi, 2021).

IC can have a long-term impact on a company's financial health and credit rating (Guimón, 2005). Based on the previous studies, IC is crucial to enhancing the current economy (Lev & Gu, 2016; Beaver *et al.*, 2005). According to Dumay and Tull (2007), effective management of IC can boost a company's credit ratings, lower loan payments, improve performance, and boost market value. The application of IC indicators can aid in lowering the risk of bankruptcy, which, in turn, minimizes job losses and other unfavorable societal effects. The use of IC

in bankruptcy forecasting can aid in allocating suitable financial resources and investments in businesses that manage their IC. In modern knowledge-based economies, businesses are the main drivers of economic and social growth (Cenciarelli *et al.*, 2018).

IC is a crucial component for driving a company's future growth. However, the traditional financial statement falls short in capturing the majority of IC, which encompasses hard-to-measure factors such as employees' knowledge, skills, expertise, innovation, stakeholder relationships, systems, and databases. Additionally, the traditional accounting system only takes into account tangible assets, neglecting the countless intangible assets that significantly contribute to an organization's production and value creation, except for goodwill, concessions, and licenses. As a result, some researchers argue that traditional business performance measures are insufficient in evaluating an organization's true firms' profitability. Therefore, experts have devised new tools and techniques to measure a firm's IC, allowing stakeholders to make informed decisions based on accurate information (Pulic, 1998; Bontis, 2001; Edvinsson & Malone, 1997; Sveiby, 2001).

Conversely, this study utilizes the resource-based theory because it recognizes the importance of developing and deploying internal resources through board choices, which might be more robust given gender equity (Hsu *et al.*, 2019). This study adds to the body of knowledge on IC from the viewpoint of industrial sector companies, which offers crucial insights for internal and external business stakeholders. The industrial sector is a widely recognized and significant one in the developing economy.

Due to the intense worldwide rivalry in many industries throughout the world, achieving business performance is one of the primary goals of each company. Intangible assets, such as human capital (HC) and customer relationships have been determined to be the primary determinants of performance in many organizations (Edvinsson & Malone, 1997). There have been few studies in Sri Lanka on the relationship between IC and firms' profitability, and the available evidence has been contradictory. In a study conducted by Puwanenthiran *et al.* (2019), the voluntary disclosure of IC in the annual reports of Sri Lankan firms for 2016/17 was examined. The results indicated that, on average, Sri Lankan firms possess an understanding of the significance of IC disclosure, even in the absence of a definitive IC disclosure framework. Furthermore, the study highlights the necessity of a mutually agreed financial reporting framework to minimize information asymmetry and agency costs.

Dulanjani and Priyanath, (2020) examine the IC and business performance of self-employers in Sri Lanka. The study finds that HC and relational capital (RC) positively and significantly impact the business performance of self-employers except for structural capital (SC). In particular, RC has the strongest and largest contribution to business performance. Likewise, Wu and Sivalogathan (2013)

analyzed the impact of IC on the organizational performance of the Apparel industry of Sri Lanka. The results reveal that IC has a positive relationship with the organization's performance. But Aruppallal *et al.*, (2015) examine the impact of IC on the financial performance of Sri Lankan banks. The findings of this research indicate that Sri Lankan banks generally have relatively lower HC and structural capital efficiency (SCE) compared to capital-employed efficiency (CEE). So, the results depict a greater impact of CEE on financial performance compared to other IC constituents.

Thusintha (2020) analyzed the impact of IC on the financial performance of Sri Lankan-listed manufacturing companies over the period 2015 to 2019. Based on the findings, IC components have a significant and positive impact on financial performance indexes, as characterized by the findings revealed by ROA and ROE. Also, suggests that investing in human, structural and relational capital is most important to increase manufacturing firms' financial performance. Aravinth and Sritharan (2021) examine the impact of IC efficiency on firm performance and examine the relationship between intellectual capital efficiency and financial performance by using data drawn from 32 manufacturing companies listed in the Colombo Stock Exchange Sri Lanka over the five years from 2015 to 2019. Findings from the regression analysis of this research indicate that intellectual capital efficiency has significant impacts on financial performance in the case of human capital efficiency (HCE). At the same time intellectual capital efficiency in the case of HCE has a significant positive correlation with financial performance.

Despite the growing recognition of IC as a critical driver of corporate success in today's knowledge-based economy, there is a notable lack of empirical research focusing on this relationship, particularly in emerging economies like Sri Lanka. Based on prior studies, there are contradictory findings in the few studies conducted in the context of Sri Lanka, and researchers used different methods to measure the IC. There are various methods used for measuring IC, including the IC-index (Jordão & Almeida, 2017), HC, RC, innovation capital, and process capital (Scafarto *et al.*, 2016), as well as the Value-Added Intellectual Coefficient (VAIC<sup>TM</sup>) (Sardo & Serrasqueiro, 2017). Among these methods, researchers commonly adopt the VAIC<sup>TM</sup> which was developed by Pulic (1998). The VAIC<sup>TM</sup> consists of two components: Intellectual Capital Efficiency (ICE) and CEE. The ICE is comprised of HCE and SCE. Later on, a modified version of VAICTM, known as the Modified VAIC (M-VAIC), was proposed by (Ulum *et al.*, 2014), which incorporates the Relational Capital Efficiency (RCE) variable. It's important to note that the choice of method can impact the research outcomes for measuring IC. This study considers the Modified VAIC method to measure the IC in industrial sector companies in Sri Lanka. Moreover, the traditional financial reporting frameworks often fail to adequately capture the value of intangible assets, which are essential for understanding a firm's true profitability. This gap in measurement and reporting further complicates the assessment of IC's impact on financial outcomes. By doing so, the research seeks to provide valuable

insights for practitioners, policymakers, and academics, ultimately contributing to a better understanding of how investments in intellectual capital can enhance firms' profitability in developing economies. The remainder of this study is structured as follows. Section two reviews the extant literature and hypothesis. Section three describes the methodology of the study. The fourth section presents and discusses the results. The conclusion is provided in section five.

## **2.2 LITERATURE REVIEW**

### **2.1 Resource - based Theory**

The resource-based theory highlights that for the resources to achieve a sustained competitive advantage, the resources must be unique which means valuable, scarce, inimitable, and difficult to substitute (Barney, 1991). The resource-based theory emphasizes that to achieve a sustained competitive advantage, resources must be unique. Wright *et al.* (1994) assert that human resource management capability is a source of sustained competitive advantage as it is embedded in the collective knowledge of the employees (inimitable), which grows throughout time (rare) and the firm processes lead to exploitation of employees' capabilities (valuable) to achieve the firm objectives, thus, create value. Wright *et al.* (1994) results conclude that having strong HC is an advantage and is critical as human resources are most difficult to imitate.

The resource-based theory has been applied in various research relevant to the understanding of the relationships between IC and firm performance (Reed, 2000; Tseng *et al.*, 2005). The theory attributes value creation potential and high firm performance to organizational resources and capabilities (Bharadwaj, 2000), and not to its industry structure (Tseng *et al.*, 2005). In other words, the resource-based theory emphasizes the usage of internal resources, both tangible physical assets and intangible assets which have been internalized and used effectively by firms to achieve competitive and profitable activities (Riahi-Belkaoui, 2003; Wernerfelt, 1984).

### **2.2 Intellectual Capital**

Although there is still no universally accepted definition of IC, it can generally be understood as the valuable knowledge that an enterprise possesses. Edvinsson and Malone (1997) define IC as encompassing various factors such as practical experience, organizational technology, customer relationships, and professional skills. All of these elements contribute to a company's ability to gain a competitive advantage in the market.

IC is the intellectual material, knowledge, experience, intellectual property, and information that can be used to create wealth (Bontis & Fitz-enz, 2002). IC may also be defined as the sum of all of the knowledge and capabilities possessed by a company that permits it to obtain a sustainable competitive advantage (Sardo

& Serrasqueiro, 2017). Brooking (1997) defined IC as a combination of intangible market assets, intellectual property, human-centered assets, and infrastructure that enable a company to function. With rapid industrialization and technological change, IC management has redefined the traditional performance measurement system for achieving and enhancing organizational competitiveness (Edvinsson & Malone, 1997).

### **2.3 Intellectual Capital and Firms' Profitability**

A company's competitiveness is determined by its possession of valuable and inimitable resources. This enables the company to achieve a favorable competitive position, maintain its market position, and attain superior performance. Therefore, firms need to identify, maintain, and develop their intellectual capital resources. Various studies have investigated the relationship between IC and firms' profitability, but there are still mixed results.

#### *Human Capital Efficiency and Firms' Profitability*

Human capital efficiency is considered the cornerstone of any progress in economic growth and development for any country. One effect of human capital efficiency on firms' profitability is considered in various empirical studies. Smriti and Das (2018) stated that human capital efficiency has a major impact on firm productivity. Businesses should prioritize offering their employees competitive salaries and comprehensive benefits that align with their level of commitment. They should also create opportunities for career advancement and professional development. Additionally, companies need to develop training programs, improve employee qualifications, and invest in facilities and working conditions. By doing so, employees can enhance their productivity, contribute to the overall performance of the company, and develop their skills and knowledge (Tran & Vo, 2020). According to Aman-Ullah *et al.* (2022), there exists a significant and positive correlation between a company's overall success and its human capital capacity, human capital skills and human capital knowledge. The relationship between human capital knowledge and organizational performance can be moderated by creative leadership. Based on the above, the following hypothesis has been developed,

H1: Human capital efficiency has a significant impact on firms' profitability

#### *Structural Capital Efficiency and Firms' Profitability*

According to Waseem *et al.* (2018), the structural capital of an organization provides a foundation for employees to be more creative and innovative compared to their HC, which is owned exclusively by the organization. The structural capital also creates a conducive work environment for organizational learning, knowledge growth, and the conversion of information into knowledge, ultimately leading to a highly productive firm performance (Salim & Djausin,

2020; Waseem & Loo-See,2018). Structural capital plays a crucial role in measuring and developing intellectual capital within an organization. As Bontis pointed out in 1998, in the absence of structural capital, intellectual capital would be limited to HC only. Structural capital also helps organizations minimize their costs and maximize profits per employee. It is crucial to note that the influence of structural capital on a company's performance may differ based on various factors such as industry, size, and the stage of development. Therefore, firms must manage their structural capital efficiently to maximize its impact on performance. This may involve investing in information technology, creating a culture of knowledge sharing, and developing strong processes and routines. Based on the above, the following hypothesis has been developed,

H2: Structural capital efficiency has a significant impact on firms' profitability.

#### *Relational Capital Efficiency and Firms' Profitability*

Relationships with customers, suppliers, and stakeholders that influence the company's life can be defined as relational capital. Competitive advantages are important to increase corporate performance, and for that, customer relations are a crucial factor (Arslan & Zaman, 2014). Relational capital is considered as the knowledge that is established through the firm's external relations. Relationships with agents, consumers, suppliers, competitors, partners, clients, shareholders, industry associations, members of the community, society, government, the state, and informal networks all include relational capital (Inkinen *et al.*, 2015). The value of the firm is directly related to the accumulated knowledge of relationships with third parties. The high level of relational capital and its related knowledge gathered may result in problem-solving, better planning and development, and troubleshooting for a firm, which in the long run is more likely to increase efficiencies and reduce organizational costs (Siddiqui & Asad, 2014). Moreover, the higher the level of relational capital, the better planning, problem-solving, and troubleshooting, all of which most likely increase production and service delivery efficiencies and thereby, reduce organizational costs (Youndt *et al.*, 2004). Based on the above, the following hypothesis has been developed,

H3: Relational capital efficiency has a significant impact on firms' profitability.

#### *Capital Employed Efficiency and Firms' Profitability*

Capital employed is an important factor for firms to maintain good relationships with their internal and external stakeholders, including consumers, customers, government, suppliers, employees, and creditors. Efficient capital employed contributes to the ability to generate revenues, which can increase firms' profitability. It encompasses the total capital utilized in operations to generate profits, including investments in physical assets and working capital. Effective management of capital employed ensures that firms possess the necessary resources to meet stakeholder expectations, such as providing quality products

and services and investing in innovation. Moreover, prudent capital management reflects financial stability, fostering trust among creditors and investors, which can lead to improved financing terms. The efficient utilization of capital also enhances operational performance, positively impacting customer satisfaction and loyalty. Additionally, investments in human capital, such as employee training and development, contribute to workforce engagement and retention, further strengthening internal relationships. The responsible management of capital employed not only creates value for stakeholders but also ensures regulatory compliance and enhances the company's reputation within the community. Ultimately, companies that prioritize the strategic management of capital employed are better positioned to build strong stakeholder relationships, contributing to long-term success and sustainability. CEE refers to all the essential physical capital and financial funds, as highlighted by Yousaf in 2022. Based on the above, the following hypothesis has been developed,

H4: Capital employed efficiency has a significant impact on firms' profitability.

### **3. METHODOLOGY**

#### **3.1 Data and Sample**

The study uses secondary data collected from the annual reports of companies listed on the Colombo Stock Exchange of Sri Lanka from 2018 to 2022. The population consists of 35 companies listed under the industrials sector. The industrials sector consists of the listed companies under the capital goods, commercial & professional services and transportation sectors. Based on the availability of annual reports and data for the sample period, the final sample consists of 31 companies.

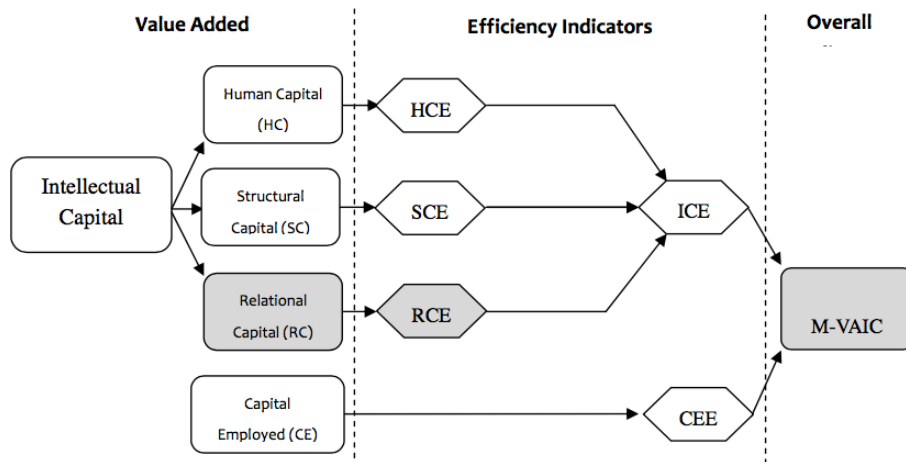
#### **3.2 Model Specification**

The most widely used measurement by researchers is the VAIC<sup>TM</sup> developed by Public (1998). VAIC<sup>TM</sup> consists of two components: Intellectual Capital Efficiency (ICE) and Capital Employed Efficiency (CEE). ICE consists of Human Capital Efficiency (HCE) and Structure Capital Efficiency (SCE). This VAIC<sup>TM</sup> was later developed by Ulum *et al.* (2014), who added the Relational Capital Efficiency (RCE) variable that is modeled as Modified VAIC. The study uses the Modified Value-Added Intellectual Coefficient (MVAIC) for measuring intellectual capital.

The VAIC<sup>TM</sup> method has several advantages. Firstly, it focuses on the value added to the income statement, without conflicting with other fundamental accounting principles. Secondly, it enables companies to benchmark their performance based on the efficiency of their intellectual capital (IC) and can be applied to different levels of the business, as well as at the national level to develop strategies for improving performance. Thirdly, it is a technique that enhances cognitive



understanding and enables easy calculation by internal and external stakeholders. Fourthly, it is objective and verifiable. Fifthly, it is easy to use as ratios and data can be easily retrieved from accessible financial statements by the public. Finally, it is an appropriate tool for measuring the potential and open intellectual performance of a business (Stähle *et al.*, 2011). Figure 1 illustrates the MVAIC model.



**Figure 1: MVAIC model**  
Source: Diyanty *et al.*, (2019)

MVAIC is calculated as follows:

$$VA = OP + DEP + AMOR + EC \dots\dots\dots(1)$$

$$CEE = VA/CE \dots\dots\dots(2)$$

$$HCE = VA/HC \dots\dots\dots(3)$$

$$SCE = SC/VA \dots\dots\dots(4)$$

$$RCE = RC/VA \dots\dots\dots(5)$$

$$ICE = HCE + SCE + RCE \dots\dots\dots(6)$$

$$MVAIC = ICE + CEE \dots\dots\dots(7)$$

VA is a value-added company, OP is operating profit, DEP is depreciation, AMOR is amortization, EC is employee cost, CEE is capital employed efficiency, and CE is measured using total assets minus intangible assets. HCE is human capital efficiency, HC is measured using total employee cost, SCE is structure capital efficiency, SC is measured using VA-HC, RCE is relational capital

efficiency, RC is measured using marketing cost, ICE is intellectual capital efficiency, and MVAIC is the modified value-added intellectual coefficient.

The dependent variable used in this research is firms' profitability. It is measured using ROE (return on equity) = net income/total equity, OPA (Operating Profit to Assets) = operating profit/ total assets, and GPA (Gross Profit to Assets) = Gross Profit/ Total Assets.

The control variables in this study used are firm size (FS) and leverage (LEV). Firm size is measured using a log of total assets and leverage is measured using the ratio of total debt to total assets.

To study the impact of intellectual capital on firms' profitability, the study specifies the following models.

Model I:

$$ROE_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 CEE_{it} + \beta_5 FS_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \dots\dots\dots(8)$$

Model II:

$$OPA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 CEE_{it} + \beta_5 FS_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \dots\dots\dots(9)$$

Model III:

$$GPA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 CEE_{it} + \beta_5 FS_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \dots\dots\dots(10)$$

## 4. FINDINGS AND DISCUSSION

### 4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the study. Mean of profitability ratios ROE, OPA, and GPA are 0.231, 0.112 and 0.187 percent respectively, as reported in the financial statements. The human capital efficiency in terms of the sector's value-added output had a maximum ratio of 78.056, the least ratio was 0.534 and the mean value stood at 5.770. This indicated that many companies exhibit higher efficiency levels in terms of HC usage. Similarly, the capital employed efficiency exhibited the minimum returns of 0.010 to the value-added, while the maximum efficiency ratio was 5.831, and the mean efficiency capital employed ratio was 0.508. This indicated that HC is better used than capital employed. Structural capital efficiency had a maximum ratio of 1, the least ratio was -0.872 and the mean value stood at 0.523. Furthermore, relational capital has a maximum ratio of 3.813, and the lowest ratio was 0.000 with the mean value of 0.186.

Comparison of capital employed efficiency, human capital efficiency, relational capital, and structural capital efficiency values implies that value added in the industry generated resulted more from human resources than from tangible and structural assets during the study period.

**Table 1: Descriptive Statistics**

	HCE	SCE	RCE	CEE	FS	LEV	ROE	OPA	GPA
<b>Mean</b>	5.770	0.523	0.186	0.508	8.107	0.519	0.231	0.112	0.187
<b>Med</b>	2.441	0.590	0.034	0.234	7.955	0.449	0.148	0.065	0.115
<b>Max</b>	78.056	1.000	3.813	5.831	10.784	1.128	2.467	1.738	1.187
<b>Min</b>	0.534	-0.872	0.000	0.010	5.776	0.091	-1.116	-0.067	0.001
<b>S.D</b>	12.450	0.383	0.525	0.849	1.283	4.316	0.538	0.246	0.222

Source: Developed by authors

#### 4.2 Correlation Statistics

Table 2 shows the correlation matrix of the variables used in the study. The correlation between HCE and ROE is 0.544 and significant at 5%. SCE and ROE have a positive relationship at a 5% significant level. HCE and SCE have significantly positively correlated with the OPA of industrials sector companies in Sri Lanka. CEE has a significant positive relationship with GPA at a 5% significant level. However, HCE, SCE and RCE are not significantly correlated. The control variables LEV has significant positive relationship with ROE and FS is not correlated with firms' profitability.

**Table 2: Correlation Matrix**

<b>Prob / Corr</b>	HCE	SCE	RCE	CEE	FS	LEV
<b>ROE</b>	0.544**	0.299**	-0.092	-0.012	0.103	0.484**
<b>OPA</b>	0.894**	0.384**	-0.085	0.214	0.174	0.079
<b>GPA</b>	-0.227	-0.238	0.004	0.289**	-0.174	0.087

Source: Developed by authors

### 4.3 Unit root test

Table 3 displays the results of the Augmented Dickey-Fuller (ADF) test, which is used to determine the stationary nature of data. The P-values for all variables are less than 0.05, indicating that all variables are stationary and not dependent over time. Therefore, it can be concluded that the data does not have any unit root at zero lag with no time and no drift trend.

**Table 3: Augmented Dickey-Fuller Test**

Variables	Probability
HCE	-13.59678 (0.0000)
SCE	-5.136367(0.0001)
RCE	-6.762543 (0.0000)
CEE	-3.98745 (0.0033)
FS	-3.597847 (0.0091)
LEV	-6.160813 (0.0000)
ROE	-8.357046(0.0000)
OPA	-18.10272(0.0000)
GPA	-5.339433(0.0000)

Source: Developed by authors

### 4.4 Multicollinearity Test

Table 4 summarizes the variance inflation factor for both the explanatory and control variables used in this study. The VIF test is conducted to identify multicollinearity issues in the regressive model, where the set of regressors is used with the dependent variable. If the VIF is greater than 10, then there is a multicollinearity problem (Hair *et al.*, 1995). However, in this study, there was no multicollinearity problem detected among the IC and control variables as all VIFs were less than 10.

**Table 4: Multicollinearity Test**

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.007675	59.33149	NA
HCE	1.91E-06	2.740744	2.248507
SCE	0.001190	3.840301	1.326407
RCE	0.000524	1.237918	1.098007
CEE	0.000431	3.217479	2.356173
FS	9.75E-05	50.75523	1.216708
LEV	1.96E-05	2.791372	2.775919
ROE	0.001250	3.268587	2.749096
OPA	0.000103	2.777759	2.761371
GPA	0.004203	2.720645	1.579367

Source: Developed by authors

#### 4.5 Hausman and Lagrange Multiplier Test

The study has utilized the Lagrange multiplier technique to determine the best model between the Pooled Regression Model (PRM) and Random Effect Model (REM). The PRM hides any diversity among the variables since the observations are combined (Nwakuya & Ijomah, 2017). To decide between the Fixed Effect Model (FEM) and REM, the study has used the Hausman test.

**Table 5: Hausman and Lagrange Multiplier Test**

Models	Lagrange Multiplier	Hausman Test	Appropriate Model
<b>Model I</b>	1.739265 (0.0410)	3.684085 (0.7193)	REM
<b>Model II</b>	1.040497 (0.0212)	12.397107 (0.0537)	REM
<b>Model III</b>	1.740242 (0.0409)	6.893468 (0.3308)	REM

Source: Developed by authors

This test decides on the most suitable model based on a fundamental dissimilarity between static and random effects to confirm whether the independent variables are genuinely independent and not endogenous. Table 5 shows the outcomes of these tests. Both the Lagrange multiplier and Hausman tests have indicated that the REM is the most appropriate model to estimate models in this study.

#### 4.6 Panel data Regression Analysis

The table displays the results of a random effect regression model. According to these results, human capital efficiency has a positive influence on firms' profitability in terms of ROE and OPA. This indicates that companies should prioritize investments in HC and talent management to improve their firms' profitability. It is supported by previous studies of AlMomani et al., (2023), Tran and Vo (2022), and Sonali and Kowsala, (2022).

**Table 6: Panel Data Regression Results**

Variables	Model I (ROE)	Model II (OPA)	Model III (GPA)
HCE	0.022049**	0.016968**	-0.003611
SCE	0.123349	0.046899	-0.089806
RCE	-0.000466	0.010199	-0.006339
CEE	0.216243**	0.067653**	0.123182**
FS	-0.026574	-0.014311	-0.027982
LEV	0.087195**	0.010930**	0.022381**
Constant	0.118396		0.414195
F Statistics	11.43340(0.0000)	42.24242(0.0000)	2.678591(0.0259)
Adjusted R Squared	0.546249	0.826351	0.162257

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

Source: Developed by authors

Additionally, capital-employed efficiency has a positive impact on firms' profitability in terms of ROE, OPA, and GPA. This suggests that companies can achieve success by investing their capital in a way that creates value-added, resulting in positive ROE, OPA, and GPA. This finding is supported by Xu and Liu (2020), and Chukwu and Egbuhuzor (2017). However, structural capital

efficiency and relational capital efficiency did not show any significant impact on firms' profitability. This finding is supported by Xu and Wang (2018) and Xu and Liu (2020). The insignificant effects of structural capital demonstrate that companies must focus on developing it by adopting a clear knowledge strategy, implementing effective information systems and tools, and fostering an innovative organizational culture. Additionally, companies should establish technological innovation networks to boost their technology innovation capabilities and strive to build good social relationships with their customers and suppliers to enhance their corporate image. Finally, leverage has a positive impact on firms' profitability in terms of ROE, OPA, and GPA at a 5% significant level, while the control variable firm size has no significant impact on firms' profitability.

Following the discussion of these findings, hypothesis testing was conducted to evaluate the relationships between capital employed efficiency and firms' profitability metrics, such as return on equity, operating profit to assets, and gross profit to assets. The results indicate that human capital efficiency has a positive influence on firms' profitability, specifically in terms of return on equity and operating profit to assets. This supports the hypothesis H<sub>1</sub>, suggesting that companies should prioritize investments in human capital and talent management to improve their firms' profitability. Structural capital efficiency did not have a significant impact on firms' profitability. Therefore, H<sub>2</sub> is not supported by the results. Likewise, relational capital efficiency also did not show any significant impact on firms' profitability. Thus, H<sub>3</sub> is not supported by the findings. Further, capital employed efficiency has a positive impact on firms' profitability in terms of ROE, OPA, and gross profit to assets. This supports the hypothesis H<sub>4</sub>, indicating that companies can achieve success by efficiently utilizing their capital to create value-added outcomes. This finding underscores the strategic role of capital employed as a resource for firms aiming to optimize their financial outcomes and stakeholder relationships. Ultimately, companies that prioritize the strategic management of capital employed are better positioned to build strong stakeholder relationships, contributing to long-term success and sustainability.

The findings of this study underscore the importance of human capital and capital employed efficiency in driving firms' profitability in the industrials sector of Sri Lanka. For researchers, these insights open avenues for further exploration into the nuances of intellectual capital, its measurement, and its impact on organizational success. By addressing the limitations identified in the study and expanding the research scope, future studies can contribute to a more comprehensive understanding of how intangible assets influence firms' profitability in various contexts.

## **5. CONCLUSION**

The present study aims to investigate the impact of intellectual capital on the firms' profitability of industrial sector companies in Sri Lanka from 2018 to 2022.

The study included 31 companies in the industrials sector listed on the Colombo Stock Exchange. Based on panel data regression analysis, the research suggests that capital-employed efficiency has a positive impact on firms' profitability, as higher capital-employed efficiency of a capital goods firm leads to greater profitability. Moreover, the study indicates that HCE has a positive impact on the firms' profitability, implying that investments in developing employees' skills are reflected positively in the profitability of listed capital goods companies. The study's findings will provide valuable insights to practitioners, policymakers, and top-level managers to ensure the effective utilization of intellectual capital. However, it is important to note that the study has certain limitations, such as a small sample size, which may restrict the generalizability of the results to other sector businesses. Therefore, further research is required to validate the findings in a larger sample.

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