



## INFLUENCE OF INTELLECTUAL CAPITAL ON COMPANY PERFORMANCE

N. C. Wickramaarachchi<sup>1\*</sup> and B.K. Nelumika<sup>2</sup>

<sup>1</sup>Senior Lecturer, Department of Estate Management and Valuation, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka

<sup>2</sup>Undergraduate, Department of Estate Management and Valuation, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka. E-mail: [kavindinelumika10@gmail.com](mailto:kavindinelumika10@gmail.com)

\*Corresponding Author: E-mail- [nishani@sjp.ac.lk](mailto:nishani@sjp.ac.lk)

Received : 19 January 2022; Revised : 17 February 2022; Accepted : 16 March 2022; Published : 30 June 2022

**Abstract:** Insights into the intellectual capital (IC) on financial performance is relatively a modern phenomenon, attracts the interest of global researchers. Though famous in the banking and communication sectors, little evidence finds in Real Estate and the Consumer Service Sectors. This study focuses to assess the relationship between IC and financial performance (FP) of 46 Real Estate and Consumer Service PLCs listed in Colombo Stock Exchange, Sri Lanka, during 2015 - 2018. The Value-Added Intellectual Capital (VAIC) model with its three primary components is represented by secondary data from annual reports of companies on IC. The FP was represented by Return on Assets and Return on Equity. The findings indicated that VAIC has a positive relationship with FP of the above 46 PLCs, indicating that CEE and FP have a significant positive effect. Recommends, more investments in IC associated activities, ensuring better performance where moderate and weak relationships exist.<sup>1</sup>

**Keywords:** J24 Intellectual Capital, L25 Financial Performance Real Estate, L8 Consumer Service Sector

### 1. INTRODUCTION

The company financial performance research gained the momentum of relying on the value of 'knowledge assets' being recognized as a vital resource. Current outcomes of most companies are based on knowledge-intensive activities and depend on intellectual capabilities captured in intellectual capital (IC). Several scholars have characterized IC in different terms such as knowledge assets, intangible assets, and intellectual assets based on how it contributes to optimizing value development productivity in a knowledge-based economy. Despite the lack of a universal definition,

#### To cite this article:

N. C. Wickramaarachchi and B.K. Nelumika, 2022; Influence of Intellectual Capital on Company Performance. *Indian Journal of Finance and Economics*, Vol. 3, No. 1, pp. 55-70. <https://DOI: 10.47509/IJFE.2022.v03i01.05>

the term IC has been defined in the literature as a set of non-financial assets that includes knowledge, human capital, and structural capital. According to Edvinsson (1997), IC has several components and may be described as the appreciation of collective human and structural assets that include knowledge as a component. It is a study for relationships among people, ideas, and knowledge that incorporates off-balance-sheet values. As a result, IC is a “relational issue” rather than a “thing” or an “objective.”

Due to its intangibility, IC is not explicitly recorded on a company’s balance sheet, but it plays a significant role in value creation, with companies in knowledge-based economies depending on knowledge assets rather than physical assets to strengthen their strategic advantages. Several organizations use the methods of training, research, and development to improve workforce skills. They have put money into consumer and seller relationships, as well as technology and data networks. Such actions, dubbed “intellectual capital investments.” This change in investment behaviour can be attributed to a growing focus on knowledge-based economies (Stewart, 2002; Zeghal and Maaloul, 2010).

The fundamental reason for why IC is essential in investing decisions is that the difference between a company’s book value and market value is determined by company’s IC (Ousama *et al.*, 2020). However, direct measuring was the challenge, faced by the traditional accounting methods. In the knowledge-based socioeconomic era, when intellectual capital has become one of the development determinants, traditional accounting techniques will no longer be able to measure company performance (Berzkalne and Zelgalve, 2014; Gan and Saleh, 2008). Therefore, there is an increasing need to implement innovative approaches that consider both intellectual and physical resources.

The financial sector is one of the most apposite areas for reviewing and exploring IC due to the financial industry’s service and intellectual nature, which places a greater emphasis on expertise and employee skills than on financial and physical resources. In addition, this financial sector is well-known for its accurate statistics (Chang, 2013). Pulic’s Value Added Intellectual Coefficient (VAIC) model is being used in recent study in sectors such as banking, manufacturing, and communication to explore the relationship between intellectual capital and financial performance (Pulic, 2000; Ercan *et al.*, 2003; Pulic, 2004; Chen *et al.*, 2005; Mondal and Ghosh, 2012; Joshi *et al.*, 2013; Yalama, 2013) although there is little evidence in the Real Estate Sector. This approach aims to measure the effectiveness of key resources within the organization which comprehended three aspects of IC as Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), and Capital Employed Efficiency (CEE). Pulic views, the traditional

accounting centred on cost control, whereas a higher profile analysis of the value creation method is required. To manage the interest, he points out; it must come under the valuation. VAIC model is used income statement and balance sheet values to determine if any value-added occurs in a firm that can be attributed to increasing its IC growth. It is expected that the VAIC metric will be designed in such a way that it would satisfy these criteria and measure the effectiveness of key resources within the organization.

Colombo Stock Exchange (CSE) in Sri Lanka maintains the registration of companies where there are limited numbers of companies already registered. These listed companies mostly reported the intellectual capital disclosure activities under the intangible assets in annual reports. On similar grounds with other countries, the company's financial statements do not show the actual image of the company's knowledge assets and the contribution to overall performance. Therefore, the finding of the study is mostly imperious for all stakeholders who are interested in companies' financial and non-financial details. Researchers have undergone with the IC performance identifying research in sectors like banking and communication in Sri Lanka, thus indicate an absence in Real Estate and Service sectors. Because they are unaware of the relevance of IC as a value creation resource, some companies may not have been utilizing it yet due to insufficient study findings in this study area. A typical example from recent research in Turkish, where Nassar (2018) agreed that VAIC of Turkish Real Estate Companies shows a considerable association with the financial performance, yet poorly used the IC to capture more value. Considering the importance and requirement for valuation of IC in the Real Estate and Consumer Service companies, this study contributes to the valuation and comparison of the value-added intellectual coefficient (VAIC) of listed real estate and customer service companies in Sri Lanka. Hence the main objective of this research is to evaluate the relationship between IC and the financial performance of Real Estate and Consumer Service PLCs listed in CSE. The findings will support the interested parties of the companies both internal and external in providing them with knowledge for understanding and evaluating their performance, self-benchmarking, and enhancing their IC performance.

## **2. LITERATURE REVIEW**

### **Intellectual Capital**

Jon Kenneth Galbraith was the one who coined the term "intellectual capital" (IC) in 1969 (Khaliq *et al.*, 2011). Despite the fact that it has been

around for a long time, no exact definition of IC has yet been agreed upon. The vast majority of meanings are focused on common principles such as employee information, expertise, interactions, abilities, customer and employee engagement and satisfaction, company credibility, organizational processes and practices, organizational cultures, and value development (Davenport and Prusak, 1997; Nick Bontis, 2000; Ghosh and Mondal, 2009; Lu *et al.*, 2014). According to Hall (1992) described that IC is the variety of contemporary value drivers successful in turning enterprise capital into extra-tangible belongings of value (Bontis, 2000; Yalama and Coskun, 2007). Similarly, IC is defined as the non-reported asset that can be used as a strategic edge and to increase the company's potential valuation (Joshi *et al.*, 2010; Mondal and Ghosh, 2012). Most concepts rely on how businesses successfully leverage information (intangible sources) to maximize their competitive advantage or increase the firm's value.

As mentioned previously, the researchers have not settled on the components of intellectual capital and there is not a consensus in the literature on how to define intellectual capital. Nonetheless, it is generally accepted that intellectual capital is made up of three elements: viz., relation/customer capital, structural capital, and human capital. The relational capital is defined Sveiby (1997) as "Customer and Supplier relationships". The main theme of relational capital is the knowledge embedded in the marketing channels and customer relationships that an organization develops through the course of conducting business which will decorate its competitive advantage (Bontis *et al.*, 2000) Relational capital is related to an entity and its connection to external elements such as clients, resource suppliers, banks and shareholders. In other words, relational capital is an organization's capacity with its external stakeholders to build relational interest. Organizations benefit multiples by building partnership resources, such as customer and brand loyalty, customer satisfaction, market recognition and reputation, bargaining leverage, strategic alliances, and coalitions. But creating relational capital is not just necessary. The effective organization, too, should be able to keep its emotional capital.

There is no longer a good deal consensus on the definition of structural capital. Meanwhile, Ghosh and Mondal (2009) argued that structural capital is the infrastructure of human capital and consists of buildings, hardware, software, processes, patents, and trademarks. Consequently, in 2010, structural capital is defined as patents, ideas, models, and administrative and computer systems (Diez *et al.*, 2010). Further contributing to the views of Ghosh and Mondal (2009) and Diez *et al.*, (2010) further claimed that structural capital will comprise internal factors like infrastructure, processes, and business culture, and at a comparable time. It is this capability that

enhances the ability of employees but is not related to individual-level employees. In line with the definitions established above, generally, structural capital consists of all the non-human storehouses of knowledge in organizations that include the databases, organizational charts, process manuals, strategies, routines, and anything whose value to the organization is greater than its material value. Sveiby (1997) describes that human capital as “the ability to act in a wide range of situations to build tangible as well as intangible assets”. It represents the employees’ skills and knowledge which can be further improved with the aid of the training. Human capital may be restricted to micro (individual) (e.g. personal qualities, technical skills, and creativity) or macro (organizational) levels (e.g., teamwork, healthy work environment) (Joshi *et al.*, 2013; Mondal and Ghosh, 2012). Hence, human capital is the most significant asset of a company and a source of innovation and strategic renewal which benefited as technical failures, risk-taking, and problem-solving.

### **Measuring IC in a Different Context**

Pulic (2000) published the first analytical analysis of intellectual capital, which looked at the impact of IC on firm results while developed an approach called “Value Added Intellectual Capital” (VAIC) for measuring IC and company financial results using accounting tools. It has paved the way for researchers from all over the world to assess IC productivity in a variety of fields. In the Malaysian Context, Bontis *et al.*, (2000) studied the impact of accounting IC components (HC, SC, and RC) on the efficiency of Malaysian service and non-service firms. They exposed the positive impact of HC and relational capital on the service sector. In the south Asian context, Kamath (2008) found that human capital had a key impact on Pharmaceutical companies’ competitiveness and financial performance in India. Similarly, Makki *et al.*, (2008) analysed the company facts from the Lahore Stock Exchange (Pakistan) for six years and found that companies in the oil and gas, chemical, and cement sectors had the best IC performance, while the performance of the banking sector was average, and public sector firms had the best IC performance. Again the Malaysian Context, Bontis *et al.*, (2010) examined the relation between IC and financial performance in Malaysian industries and confirmed the positive impact of IC within two industry sectors. Simultaneously, Tan *et al.*, (2010) analysed 150 companies listed on the Singapore Stock Exchange and found that the success of a company had a positive relationship with the magnitude of IC with the growth rate of the IC. IC’s contribution to the success of a company was also varied by type of industry. Again, in the South Asian Context, Pal and Soriya (2012) researched pharmaceutical and textile companies in India and

concluded that there was a positive association between IC and business profitability. Thus, Chang (2013) found that the impact of intellectual capital on financial performance is directly / indirectly positive while results by Lu *et al.*, (2014) presented that the relationship between Intellectual Capital and the company's performance was positive and significant. Later more studies by Muhammad and Ismail (2014) in Malaysia observed the effect of IC efficiency on financial sector performance. The grades indicated that the banking sector depends more on intellectual capital than on the brokerage business and the insurance industry. The results also exposed a significant positive association between IC and Return on Asset (ROA). The study also highlighted that, in creating market value, the Malaysian financial sector relies more on financial and physical capital than on intellectual capital. As a result, the VAIC model has been created and used in a range of research all over the world to examine the impact of intellectual capital on business performance.

Accordingly, the present study will be analysed the relationship between the efficiency of intellectual capital and financial performance of real estate PLCs and consumer service PLCs in Colombo stock exchange in Sri Lanka, Return on assets (ROA) and return on equity (ROE) are used as measures of financial efficiency, whereas VAIC and its components (CEE, HCE, and SCE) are used as indications of intellectual capital. Many findings in the literature claim that financial performance metrics and VAIC have a positive relationship. However, there is an on-going discussion about which VAIC components boost financial institution efficiency as per the different contexts. As a result, the purpose of this study is to have a greater understanding of the relationships between IC and financial performance of Sri Lanka's leading listed real estate and customer service companies.

### **3. METHODS**

#### **Population and Sample**

A total of 289 companies (banking, real estate, customer service, hotels, healthcare, etc.), were registered in the Colombo Stock Exchange (CSE) from 2015 to 2018. Amongst the study was selected all real estate (27) and consumer service (19) companies to fulfil the research aim. Because the number of listed companies in the CSE is limited compared to other stock markets, all listed companies in real estate and consumer service were chosen to assure that this study reflects reliability. For four years, a total of 46 companies were included in the sample (2015 -2018).

#### **Data and Method of Analysis**

Preferably, the study selects the VAIC model as the most effective approach to determine the relationship between intellectual capital (IC)

and financial performance (FP) while measurement was conducted using a quantitative approach. Thus, descriptive statistics and inferential statistics whereas correlation and regression models were deployed to explore an overall picture in quantitative terms. Based on VAIC components, the data was obtained from secondary sources i.e. during a period of four (04) years, indicating 2015-2018, from the annual reports of the chosen listed companies.

### **Value Added Intellectual Capital (VAIC Model)**

The VAIC Model is an intellectual capital (IC) quantifiable measuring tool that is mainly used to measure the intellectual capital and financial performance relationship. In 1998, Ante Pulic has developed the VAIC model. The initial studies were based on the relationship between intellectual capital and monetary indicators connected to performance. The model supported the value creation that was obtained in varied regional corporations. Thus, his studies developed the strategy to evaluate the efficiency of the intangible resources of the business (Pulic, 2004; Pulic, 2008). The model was subsequently improved and determined that the money invested in every unit of resource, creates a brand-new value for the businesses. The model considered that the human resources and structural resources associated with each other can be combined as specific resources, while corporations may generate greater value-added and coefficient (Pulic, 2008). In addition, the model was once outperforming other models whereby the model has been primarily used to measure overall performance in mainly associated real estate's sectors such as finance, consumer services, and actual property from different countries over the previous ten years, such as in Brazil, Japan, Turkey, Malaysia, India, and Sweden. The increasing number of intellectual capital expertise and assessment had indicated the value and enhancement of management throughout different sectors. According to Pulic, (2004) the formula and its components of the model are developed and deriving the variables of the intellectual capital is indicated in the Table 1.

Two dependent variables were chosen for the analysis based on financial performance indicators. The research work is aimed for financial performance metrics such as Return on Assets (ROA) and Return on Equity (ROE) among the companies. The Value-Added Intellectual Coefficient was selected as the study's key independent variable. Thus, the the three variables are included in VAIC model. Viz., Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), and Capital Employed Efficiency (CEE), and the study aim to analyse all categories.

**Table 1: Variables in VAIC Model**

<i>Variable</i>	<i>Formula</i>
Value added (VA)	Operating profit + employee cost + Depreciation + Amortization (OP+EC+D+A)
Capital employed (CE)	Equity + long-term liabilities
Human capital (HC)	Total costs invested on employees
Structural capital (SC)	Value-added (VA) – human capital (HC)
Human Capital Efficiency (HCE)	VA / HC
Structural Capital Efficiency (SCE)	SC / VA
Capital Employed Efficiency (CEE)	VA / CE
Value Added Intellectual Capital (VAIC)	HCE+SCE+CEE
Price-earnings ratio	Market value per share/Earning per share
Assets turn over	Total Revenue/Total Book Value
Return on Assets	Net Income/Total Assets
Return on Equity	Net Income/Total Equity
Earnings per Share	Net Income-Preferred Dividends)/(Average Outstanding Shares)
Firm Age	Age of the company from its establishment time
Firm Size	Log of firm's total assets
Firm Leverage	Total debt / Book value of total assets

Source: (Pulic, 2000; Pulic, 2004)

### **Hypothesis Development**

The following hypotheses were developed to determine the relationship between intellectual capital (IC) and its components of HCE, SCE, and CEE and companies' financial performance in terms of Return On Assets (ROA) and Return On Equity (ROE):

- a) H1: There is a positive relationship between Value Added Intellectual Capital (VAIC) and its components (HCE, SCE, and CEE) and firms' financial performance indicator of ROA.
- b) H2: There is a positive relationship between Value Added Intellectual Capital (VAIC) and its components (HCE, SCE, and CEE) and firms' financial performance indicator of ROE.

## **4. RESULTS AND DISCUSSION**

### **Descriptive Analysis**

Descriptive statistics demonstrate the statistical characteristics of the variables in the study's model, as shown in Table 02. The data set has examined at the distribution of each variable in particular using descriptive measurements including mean and standard deviation. From Table 3, ROA shows a mean value of 0.035, 0.048, 0.036, 0.029 and maximum of 20%,



23%, 23%, and 39% in years 2015, 2016, 2017, and 2018 respectively, this implies that on average shareholders of consumer service and real estate companies earned 3.5%, 4.8%, 3.6% and 2.9% ROA in years of 2015, 2016, 2017 and 2018 separately. Thus ROE shows a mean value of 0.045, 0.064, 0.062, 0.030, and a maximum of 38%, 28%, 37%, and 42% in years 2015, 2016, 2017, and 2018 respectively, this implies that on average shareholders of consumer service and real estate companies earned 4.5%, 6.4%, 6.2% and 3% ROE in years of 2015, 2016, 2017 and 2018 separately. As a result, table 02 shows that in 2015, the three components of VAIC, HCE, SCE, and CEE, had mean values of 16.12, 15.12, and 0.10, respectively; 16.61, 15.61 and 0.12 in 2016; 50.97, 49.97 and 0.12 in 2017 and 26.70, 25.70 and 0.12 in 2018. This implies that in each research year, HC is the most successful factor in the problem of value production, following by SC and CE. For all research years, the standard deviation for independent variables is the highest and equal in HCE and SCE, whereas the standard deviation for dependent variables is the highest in ROE.

**Table 2: Financial Performance Descriptive Statistics from 2015 to 2018**

	<i>Valid No.</i>	<i>Mean</i>	<i>Std.Deviation</i>	<i>Min</i>	<i>Max</i>
2015					
HC	46	103,809,299	268,974,158	510,560	1,700,022,000
SC	46	221,923,875	468,154,242	(245,112,893)	2,612,124,491
CE	46	2,873,739,748	4,222,626,257	(8,956,993)	27,496,780,916
HCE	46	16.121	43.442	-14.767	224.123
SCE	46	15.121	43.442	-15.767	223.123
CEE	46	0.102	0.090	-0.073	0.316
VAIC	46	31.344	86.896	-30.606	447.342
ROA	46	0.035	0.068	-0.128	0.207
ROE	46	0.045	0.114	-0.290	0.388
2016					
HC	46	113,951,308	280,495,346	540,000	1,767,935,000
SC	46	287,624,080	486,586,660	(23,471,712)	2,583,410,232
CE	46	2,942,855,442	4,454,778,670	(132,603,889)	29,082,629,366
HCE	46	16.619	40.308	-2.343	202.040
SCE	46	15.619	40.308	-3.343	201.040
CEE	46	0.125	0.087	-0.080	0.334
VAIC	46	32.363	80.615	-5.708	403.170
ROA	46	0.048	0.062	-0.113	0.237
ROE	46	0.064	0.091	-0.131	0.284
2017					
HC	46	120,986,504	303,991,289	94,000	1,907,231,000
SC	46	345,613,975	672,069,746	(69,998,581)	3,234,155,134

*contd. table 2*

	Valid No.	Mean	Std.Deviation	Min	Max
CE	46	3,314,502,939	5,735,877,803	(19,969,982)	37,952,060,126
HCE	46	50.979	230.000	-11.783	1554.660
SCE	46	49.979	230.000	-12.783	1553.660
CEE	46	0.121	0.115	-0.207	0.350
VAIC	46	101.080	459.989	-24.670	3108.358
ROA	46	0.036	0.088	-0.235	0.233
ROE	46	0.062	0.117	-0.237	0.376
2018					
HC	46	130,020,513	320,883,695	120,000	1,979,066,000
SC	46	317,118,817	550,408,751	(69,003,745)	2,744,256,865
CE	46	3,485,668,225	5,999,603,492	(25,552,297)	39,624,436,460
HCE	46	26.708	65.010	-32.077	329.626
SCE	46	25.708	65.010	-33.077	328.626
CEE	46	0.125	0.112	-0.157	0.417
VAIC	46	52.541	130.047	-65.312	658.669
ROA	46	0.029	0.120	-0.504	0.395
ROE	46	0.030	0.187	-1.005	0.423

Source: Annual Reports of Listed Companies (2015-2018)

### Correlation Analysis

To determine the connections between the variables, the Pearson correlation technique was used. Table 3 shows the correlation results.

**Table 3: Correlation Results of the Variables**

	Correlations			
	2015			
	VAIC	HCE	SCE	CEE
ROA	.413**	.412**	.412**	.557**
ROE	.265	.264	.264	.697**
	2016			
	VAIC	HCE	SCE	CEE
ROA	.310*	.310*	.310*	.405**
ROE	.214	.213	.213	.482**
	2017			
	VAIC	HCE	SCE	CEE
ROA	.057	.057	.057	.632**
ROE	.011	.011	.011	.752**
	2018			
	VAIC	HCE	SCE	CEE
ROA	.467**	.466**	.466**	.608**
ROE	.324*	.324*	.324*	.515**

Note: \*\* Significant at 1%, \* Significant at 5%

Source: Survey Data 2020

In every research year, there is a statistically significant positive correlation between VAIC and its components of HCE, SCE, and CEE, as well as ROA and ROE. Though the results satisfy the hypotheses formulated in the research as an overall picture there are some underlines to deeply discuss. A strong positive relationship ( $< 7$ ) reflects only in 2017 between CEE and ROE. In other years, a moderate positive relationship is observed amid CEE and ROE. As a result, in the year 2018, there is a moderate positive influence between ROE and VAIC and its two components of HCE and SCE, whereas in the previous research years of 2015, 2016, and 2017, there is a low positive relationship. Meanwhile, A moderate positive relationship ( $< 3$ ) reflects amongst ROA and VAIC and its two components of HCE and SCE, in all study years apart from 2017 where a low positive relationship is identified. However, in between CEE and ROA are shows moderate positive effects in all study years.

### Regression Analysis

Using a linear model of  $y = a + b*x$ , a simplified linear regression analysis was performed using ROA (Return On Assets) and ROE (Return On Equity) as dependent variables and VAIC and its components of HCE, SCE, and CEE as independent variables.

$$\text{Model 01} = (\text{ROA}) = b_0 + b_1\text{HCE} + b_2\text{SCE} + b_3\text{CEE} + e$$

$$\text{Model 02} = (\text{ROE}) = b_0 + b_1\text{HCE} + b_2\text{SCE} + b_3\text{CEE} + e$$

**Table 4: Results of VAIC and Its Components (HCE, SCE, and CEE), as well as ROA and ROE, were subjected to Regression Analysis**

Variable		ROA (Model 01)				ROE (Model 02)			
		2015	2016	2017	2018	2015	2016	2017	2018
VAIC	$\beta$	1.011	0.310	0.057	0.467	0.265	0.214	0.075	0.324
	t	5.068	2.166	0.377	3.500	1.821	1.450	0.075	2.272
	Sig.	0.000	0.036	0.708	0.001	0.075	0.154	0.941	0.028
HCE	$\beta$	0.412	0.409	0.102	0.297	0.176	0.484	0.083	0.218
	t	3.003	3.080	0.866	3.205	1.650	1.689	0.825	1.856
	Sig.	0.004	0.004	0.296	0.005	0.106	0.071	0.414	0.960
SCE	$\beta$	0.346	0.057	0.117	0.341	0.189	0.027	0.083	0.213
	t	2.973	2.428	0.998	3.013	1.805	0.207	0.825	1.635
	Sig.	0.005	0.041	0.324	0.004	0.089	0.837	0.414	0.109
CEE	$\beta$	0.512	0.304	0.643	0.527	0.674	0.211	0.760	0.464
	t	4.400	2.285	5.472	4.658	6.308	1.999	7.589	3.555
	Sig.	0.000	0.027	0.000	0.000	0.000	0.048	0.000	0.001

Source: Survey Data 2020

The findings of model 01 reveal that, with the exception of 2017, the VAIC is positive and statistically significant in all research years, with ROA suggesting that an increase in VAIC will lead to an increase in ROA. Table 4 further demonstrates that two VAIC components, HCE and SCE ( $p < 0.05$ ), were statistically significant with ROA profitability measurement in all research years except 2017. The third component (CEE) of the VAIC indicates a positive and statistically significant outcome with profitability measurement of ROA for real estate and consumer service companies on the Colombo stock exchange of Sri Lanka in all research years. Concerning VAIC as an overall interface in model 01, that supported H1 in the year 2015, 2016, and 2018. Conversely, statistical measurements of VAIC model 01 exclude H1 in 2017. The  $R^2$  value for model 01 is 0.354 that accounts for 35%.

Model 02's explanatory effect is 49% (adjusted  $R^2 = 0.490$ ), according to the results. In the research years of 2015, 2016, and 2017, the results show that VAIC has an insignificant relationship ( $p > 0.05$ ) with profitability as assessed by ROE. However, VAIC is significantly related with the profitability as evaluated by ROE in 2018 ( $p < 0.05$ ). According to the results of model 02, VAIC is significantly more relevant in 2018 when ROE is utilized as a performance indicator. The results reveal that HCE ( $p > 0.05$ ) and SCE ( $p > 0.05$ ) were statistically insignificant with profitability (i.e., ROE) in all study years, similar to the findings of ROA. In all years, CEE ( $p < 0.05$ ) was statistically significant with profitability (i.e., ROE) for real estate and consumer service companies listed on the Colombo stock exchange of Sri Lanka. Concerning VAIC as an overall interface in model 02, it not supported for H2 in all study years. While CEE is the only component that supporting for H2 in all study years.

## 5. CONCLUSION

The purpose of this study is to examine the relationship of intellectual capital on the financial performance of real estate and consumer service PLCs in the Colombo Stock Exchange (CSE) in Sri Lanka. To achieve the purpose of this study, Pulic's value-added intellectual capital (VAIC) model was used. VAIC is an independent variable of the research, and it has three primary attributes: Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE), and Structural Capital Efficiency (SCE). The dependent variable of financial performance, on the other hand, is measured using two primary measurements: Return on Assets (ROA) and Return on Equity (ROE). In order to do so, the study examined at 46 real estate and consumer service companies that were listed on CSEs throughout 2015 to 2018.

In every survey year, the results show a positive relationship between ROA, ROE, and VAIC and its components of HCE, SCE, and CEE. Amongst, CEE is the most productive component for the profitability of real estate and consumer service companies than the components of HCE and SCE for the period of the study from 2015-2018, notably in relation to financial performance indicators such as ROA and ROE on the Sri Lankan stock exchange in Colombo. The present study's outcomes are in line with those of previous few studies of real estate and consumer service companies, e.g. Narwal & Yadav (2017) the studies on Indian real estate market, the results clearly revealed that HCE and CEE have a significant positive impact on the profitability of the Indian real estate market, however SCE has a negative impact. Later, Jaya and Setiawan (2019) claimed the investigations on real estate and property companies of Indonesia Stock Exchange (IDX), the results presented that CEE, HCE, and SCE simultaneously affected 61.80% ROA, CEE affected 47.75% ROA, HCE affected 50.41% ROA, and SCE did not affect ROA. While completely discrepancy results reflect from Nassar studies (2018) regarding the Real Estate companies located in Turkey. The finding showed that the SCE has a substantial positive association with FP in Turkish Real Estate Companies both before and after the crisis, whereas the CEE has a significant negative relationship (Nassar, 2018).

Future IC research in real estate and consumer service companies should consider how VAIC and its components can affect other financial performance metrics. The findings of this review, however, could be useful to real estate and consumer service companies while signifying more effort should be put into improving IC performance in real estate and consumer service companies to potentially improve profitability. Such attempts to improve IC performance would be helpful and would allow Sri Lankan real estate and consumer service companies to remain competitive; only then would CSE be able to achieve its goal of being the world's most efficient and powerful financial market. We can recommend increasing investment on IC with more attention on HCE and SCE to bring them for better performance of MV. Also, we see that in Real estate and consumer service sectors use of IC is somewhat weak.

Furthermore, the results of this study strongly suggest that further studies be done either assessing the relationship between efficiency of value production or profitability of firm and that how impact on organization or firms' workers individual (eg: Investor, Shareholder) wealth, or exploring the underlying assumptions of the VAICs that might be revisited in order to analyse their possible ramifications on the validity of empirical testing and outcomes.

### *Acknowledgement*

Research Grant No. ASP/01/RE/MGT/2021/48, University of Sri Jayewardenepura, Sri Lanka, and Centre for Real Estate Studies (CRES), Department of Estate Management & Valuation.

### *References*

- Berzkalne, I., & Zelgalve, E., 2014; Intellectual capital and company value, *Procedia-Social and Behavioural Sciences*, 110, 887-896.
- Bontis, N., Chua Chong Keow, W., & Richardson, S., 2000; Intellectual capital and business performance in Malaysian industries, *Journal of Intellectual Capital*, 1(1), 8-100.
- Chang, W., 2013; Are R&D and intellectual property rights related to the firms' financial performance? The perspectives on intellectual capital, *International Journal of Technology, Policy and Management*, 13(3), 245-260.
- Chen, M., Cheng, S., & Hwang, Y., 2005; An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance, *Journal of Intellectual Capital*, 159-176.
- Davenport, T., & Prusak, L., 1997; *Working knowledge - How organizations manage what they know*. Boston: Harvard Business School Press.
- Diez, J., Dickie, I., Edward, G., Hulme, P., Sullivan, J., & Duncan, R., 2010; Negative soil feedbacks accumulate over time for non native plant species, *Ecological Letters*, 13(7), 803-809.
- Edvinsson, L., 1997; Developing intellectual capital at Skandia, *Long Range Planning*, 30(3), 320-373.
- Fabian, Z., 2010; Score correlation. *Neural Network World*. 793-798.
- Gan, K., & Saleh, Z., 2008; Intellectual capital and corporate performance of technology intensive companies, *Asian Journal of Business and Accounting*, 113-130.
- Ghosh, S., & Mondal, A., 2009; Indian software and pharmaceutical sector IC and financial performance, *Journal of Intellectual Capital*, 10(3), 369-388.
- Hall, R., 1992; The strategic analysis of intangible resources, *Strategic Management Journal*, 13(2), 135-144.
- Jaya, T., & Jaya, S., 2019; Influence of intellectual capital on financial performance in real estate and property subsector companies, *Global Competitiveness: Business Transformation in Digital Era*, 34.
- Joshi, M., Cahill, D., & Sidhu, J., 2010; Intellectual capital performance in the banking sector: An assessment of Australian owned banks, *Journal of Human Resource Costing & Accounting*, 151-170.
- Joshi, M., Cahill, D., Sidhu, J., & Kansal, M., 2013; Intellectual capital and financial performance: an evaluation of the Australian financial sector, *Journal of Intellectual Capital*, 264-285.
- Kamath, G., 2008; Intellectual capital and corporate performance in Indian pharmaceutical industry, *Journal of Intellectual Capital*, 9(4), 1469-1930.
- Kaufmann, L., & Schneider, Y., 2004; Intangibles: A synthesis of current research, *Intellectual Capital*, 5(3), 1469-1930.

- Khalique, M., Shaari, N., Abdul, J., & Isa, A., 2011; Intellectual capital and its major components.
- Klein, D., & Prusak, L., 1994; *Characterising Intellectual capital*. Cambridge: Centre for Business Innovation.
- Lu, W., Wang, W., & Kweh, Q., 2014; Intellectual capital and performance in the Chinese life insurance industry, *Omega*, 42(1), 65-74.
- Makki, A., Lodhi, S., & Rashid, R., 2008; Intellectual capital performance of Pakistani Listed corporate sector, (10, Ed.) *International Journal of Business and Management*, 3.
- Mondal, A., & Ghosh, S., 2012; Intellectual capital and financial performance of Indian banks, *Journal of Intellectual Capital*, 515-530.
- Muhammad, N., & Ismail, M., 2014; Intellectual capital efficiency and firm's performance: Study on Malaysian Financial Sectors, *International Journal of Economics and Finance*, 1(2), 206.
- Narwal, K., & Yadav, N. (2017), The Impact of Intellectual Capital on the Indian Real Estate Sector Profitability and Productivity, *Journal of Commerce and Accounting Research*, 6(1).
- Nassar, S., 2018; The impact of intellectual capital on firm performance of the Turkish Real Estate Companies before and after the crisis, *European Scientific Journal*, 14(1), 30-45.
- Neuman, W., 2011; *Social research methods: Qualitative and quantitative approaches* (&th ed. Upper Saddle River ed.), Pearson Education.
- Nick Bontis, W., Keow, W., & Richardson, S., 2000; Intellectual Capital and Business Performance in Malaysian Industry, *Journal of Intellectual Capital*.
- Ousama, A., Al-Mutairi, M., & Fatima, A., 2020; The relationship between intellectual capital information and firms' market value: A study from an emerging economy, *Measuring Business Excellence*, 39-51.
- Pal, K., & Soriya, S., 2012; IC performance of Indian pharmaceutical and textile industry, *Journal of Intellectual Capital*, 13(1), 120-137.
- Public, A., 2000; VAIC (TM) - an accounting tool for IC management, *International Journal of Technology management*, 20(5-8), 702-714.
- Public, A., 2004; Intellectual capital – does it create or destroy value?, *Measuring Business Excellence*, 8(1), 62-68.
- Public, A., 2008; The principles of intellectual capital efficiency-A brief description. Croatian Intellectual Capital Center, *Zagreb*, 76.
- Riahi-Belkaoui, A., 2003; Intellectual capital and firm performance of US multinational firms: A study of the resource based and stakeholder views, *Journal of Intellectual Capital*.
- Stewart, T., 1997; *Intellectual Capital: The New Wealth of Organizations*, Doubleday/Currency, New York.
- Sveiby, K., 1997; The intangible assets monitor. *Journal of Human Resource Costing & Accounting*, 2(1), 73-97.
- Tan, H., & Hancock, P., 2007; Intellectual capital and financial returns of companies. *Journal of Intellectual Capital*, 8(1), 76-95.

- Yalama, A., 2013; The relationship between intellectual capital and banking performance in Turkey: evidence from panel data, *International Journal of Learning and Intellectual Capital (IJLIC)*.
- Yalama, A., & Coskun, M., 2007; Intellectual capital performance of quoted banks on the Istanbul stock exchange market, *Journal of Intellectual Capital*, 256-271.
- Zeegal, D., & Maaloul, A., 2010; Analysing value added as an indicator of intellectual capital and its consequences on company performance, *Journal of Intellectual Capital*, 39-60.