THE IMPACT OF INTELLECTUAL CAPITAL ON FIRM VALUE: A COMPARATIVE STUDY OF CONSUMER SERVICES COMPANIES AND CAPITAL GOODS COMPANIES LISTED IN CSE

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ABSTRACT

In the modern economic era, Intellectual capital (IC) is a key competitive advantage for a company. Thereby, this study is conducted to investigate the impact of Intellectual Capital and its components on the firm value in Consumer Service Sector and Capital Goods Sector companies listed in Colombo Stock Exchange (CSE) in Sri Lanka. The study is done as a comparison between these two sectors. It examined the data for the period from 2015 to 2020 based on the sample of 25 companies in Consumer Service Sector and 20 companies in Capital Goods Sector by using two regression models in random effect. Dependent variable for the study is Firm value and independent variables are Intellectual capital, capital employed efficiency, human capital efficiency and structural capital efficiency. The measurement of the Intellectual capital is Value Added Intellectual Coefficient (VAIC) and market to book value (MB) is used as the measurement of the firm value of the companies in both sectors. The data gathered from both sectors is analyzed using descriptive statistics, correlation analysis and regression analysis. The results and findings of the study evident that, the intellectual capital has a positive impact on the firm value in both the consumer service sector and capital goods sector companies. However, when consider the component wise impact of intellectual capital, capital employed efficiency (CEE) has a positive impact on the firm value and human capital efficiency (HCE) and structural capital efficiency (SCE) have not a positive impact on firm value in both sectors. The findings of the study contribute to identify the impact of intellectual capital on the firm value in two sectors in the Sri Lanka economy. The results are significant for shareholders, owners, managers, employees, and all stakeholders. Especially, it is significant for the investors for their decisions on investments. In addition, companies could make investment decisions on Intellectual Capital to get competitive advantages and face market challenges and competition.

Keywords: *Intellectual Capital, Human Capital Efficiency, Capital Employed Efficiency, Structural Capital Efficiency, Firm Value*

1. INTRODUCTION

The value of skills, knowledge, and business training of the employees in a company and any information that provide competitive advantages to a company is known as Intellectual Capital (IC). The modern business world is rapidly changing and dynamic. Hence, businesses need to face and fight with the competition with changing conditions by changing the suitable way. In this backdrop, organizations identified, only tangible assets are not sufficient to compete with competitors. Therefore, they identified the importance of intangible assets on achieving organizational goals.

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Because a large part of the wealth of an organization has created by IC, which the knowledge related to non-physical assets and the firm's competitive border has located in the quality of the IC components (Kehelwalatenna and Gunaratne, 2010). And it is a fund of knowledge, intangible assets, and intangible resources and capabilities that facilitating the achievement of organizational success and competitive advantages. When concerning literature, IC has been used as a strategic asset in developed economies, and then emerging economies and developing economies also have gradually focused on it (Kehelwalatenna and Gunaratne, 2010). The Intellectual Capital constitutes with structural capital, human capital, and relational capital and the Value-Added Intellectual Coefficient (VAIC) is used to measure it (Subramaniam and Youndt, 2005).

There have been lots of investigations on how IC affects the financial performance of an organization, but there is a dearth of studies on how IC affects the firm value. Abeysekera (2007) revealed that most studies based on IC have done by developed countries and fewer studies have conducted in developing countries. Most authors (Kehelwalatenna and Gunaratne, 2010; Nguyen and Doan, 2020 and Nimtrakoon, 2014) revealed that there is a positive impact of IC on firm value and some authors such as Hamdan (2017) and Mehralian et al. (2012), have revealed that the impact of IC on firm value is negative. Further, most studies have paid attention only to service-based companies. As a result, the current research focuses on the impact of intellectual capital and its components on the firm value by comparing Consumer Service Companies and Capital Goods Companies in Colombo Stock Exchange (CSE) in Sri Lanka.

As a success factor and competitive tool in the dynamic business environment, the importance of IC has rapidly increased. Therefore, based on the facts and findings of study, firms' management can understand the importance of IC as a tool of sustainable competitive advantage and value creation and then can manage IC in a better way to achieve their goals and objectives. As well this study will guide students and researchers to a new perspective to study and investigate the impact of IC on the firm value over different industries. And the study will support the investors to enhance their investment decision knowledge. Ultimately, this study contributes to the economy in Sri Lankan by adding value to Consumer Services sector companies and Capital Goods sector companies.

2. REVIEW OF LITERATURE

Intellectual capital is a combination of mental processes that can be used in the economic activities of an organization and bring income to the owners of the firm. Aruppala, Wickramasinghe and Mahakalanda (2015) revealed that, though IC is intangible, it is the major corporate and strategic asset that can generate high financial performance and sustainable competitive advantages to an organization. It has three components namely, Structural Capital (SC), Human Capital (HC), and Relational Capital (RC). The HC is based on the knowledge and skills of employees of the organization and Aruppala, Wickramasinghe and Mahakalanda (2015) have identified HC as employees' competence, commitment, motivation, and loyalty. The supportive non-physical assets that support human capital to function is Structural Capital.

It consists of organizational structures, procedures, databases, and culture of the organization. Relational capital describes the relationships between the organization and outside parties in the organization such as employees, customers, suppliers, creditors, investors, government, and other parties (Nuryaman, 2015).

Any organization cannot achieve competitive advantages solely from tangible assets and production processes (Abdulaali, 2018). Hence, IC is one of the important characters in creating sustainable competitive advantages for an organization. It brings future benefits and advantages to an organization, can quickly adapt to changes and face competitiveness through IC. However, investors do not take decisions about their investments based on the book value of the firm and more concerned about the market value of the firm's stocks. The value of the firm to their balance sheet is called book value and the market value is the value according to financial markets. If the market value of a firm is higher than its book value means that due to an increase in expected earnings of the firm with effect of IC, the market has assigned a higher value to the firm's stock (Alipour, 2012). Thereby, the study is focused to investigate whether there is such impact of Intellectual capital on creating and increasing the firm value.

Many researchers (Nuryaman, 2015; Fanni and Fuad, 2019 and Mehralian et al. 2012) have investigated the relationship and the impact of Intellectual Capital and the firm value in various industries. Most of these studies (Kehelwalatenna and Gunaratne, 2010; Nguyen and Doan, 2020 and Nimtrakoon, 2014) reveal that there is a positive impact between IC and the firm value and some others (Hamdan, 2017 and Mehralian et al. 2012) reveal a negative impact. The research changes according to the geographical region and applied components. Hamdan, (2017) investigated the impact of intellectual capital through two measures of performance: accounting measure, and market-based measurement as a comparison between 171 firms in Kindom of South Arabia and 27 in Bahrain. The results showed that the accounting-based traditional measures have a relation between intellectual capital and firm performance and there is no relationship between intellectual capital and market-based performance. With a review of analyzing, the impact of IC on firm performance and investors' response, Kehelwalatenna and Gunaratne (2010) investigated a sample comprising the financial service sector and manufacturing sector listed in CSE. The results disclosed that Capital Employed Efficiency (CEE) has a positive and significant relationship with market value; Human Capital efficiency (HCE) has a positive relationship with market value, and the last component of VAIC, which is Structural Capital efficiency (SCE) harms market value and investor response. The study of Fanni and Fuad (2019) identified that the influence of IC on firm value with earnings management as a moderating variable based on the financial service sector listed in the Indonesia Stock Exchange. Here, they used the Modified Value-Added Intellectual Coefficient (MVAIC) model to measure the efficiency of IC. The findings of the study revealed that IC provides a significant positive influence on firm value. Other than the SC, both HC and RC provided the most notable contribution to firm value.

3. METHODOLOGY

The research approach, population and sample selection, data collection methods, theoretical background, the definition of variables, conceptual framework, hypotheses, and model formulation are all covered in this section.

3.1. Sample, data, and data collection

This is based on "descriptive research design'' because it discusses how IC impacts on the firm value of the Consumer Service sector and the Capital Goods sector, rather than the why. The secondary data which is collected from the CSE website was used as data for this investigation. The population of study is large and it is not possible to get all companies in the two sectors due to the availability of data. Hence, the sample has got as 70% of the population base on data availability. Therefore, it has been taken 25 out of 35 companies in the Consumer Service industry and 20 out of 30 companies in the Capital Goods Industry listed in CSE. The study used secondary data which was gathered from the CSE website and the published annual reports. That data was gathered for the selected two sectors for six years period from financial year 2014/15 to 2019/2020.This study has used IC and its components (CEE, HCE, and SCE) as the independent variables and that variables were measured by VAIC model. CEE can be defined as the difference between the non-physical (intangible) assets and total assets of a firm. It is an indicator of firms' ability in terms of superior exploitation of physical capital. Human capital can be sort as the economic value of a worker's experience and skills. HCE indicates the actual contribution of firms' human capital to add value to the firm by money spent on them. SC is the knowledge shaped by information technology, operating procedure, and the structure of the firm. It includes knowledge of all types of non-human resources of a firm. The dependent variable is the MB ratio that measures the firm value. Market value is the current market value of all outstanding shares of a company.

Therefore, researchers have used the conceptual framework to probe the impact of Intellectual Capital on Firm Value as shown in below.

Following formulas have been used to measure the dependent and independent variables.

3.2 Independent Variables

VAIC is the most preferred method that used by most researchers (Alipour, 2012; Nuryaman, 2015 and Nimtrakoon, 2014) to value IC in their studies. It can derive from accounting information based on the Statement of Comprehensive Income and Statement of Financial Position (Ulum et al. 2014).

VAIC can be calculated using the below steps. (Ulum et al. 2014)

3.2.1. Computing Corporate Value Added (VA)

VA = Output – Input

Here, the output is the total earnings of the firm and input is the cost of services and materials used for output. Therefore, to get the difference between inputs and output, one can use the below-extended equation.

VA = OP + EC + D + A

Where,

OP = Operational Profit

EC = Employee Cost

D = Depreciation

A = Amortization

3.2.2. Computing the Capital Employed Efficiency (CEE)

CEE = VA / CA

CA = Book Value of total assets – Intangible assets

3.2.3. Computing Human Capital Efficiency (HCE)

HCE = VA / HC

HC = Total cost of the employees including salaries and wages

3.2.4. Computing the Structural Capital Efficiency (SCE)

SCE = SC / VA

SC = VA – HC

3.2.5. Computing the VAIC

VAIC = ICE + CEE

ICE = HCE + SCE

VAIC = HCE + SCE + CEE

3.3. Dependent Variable
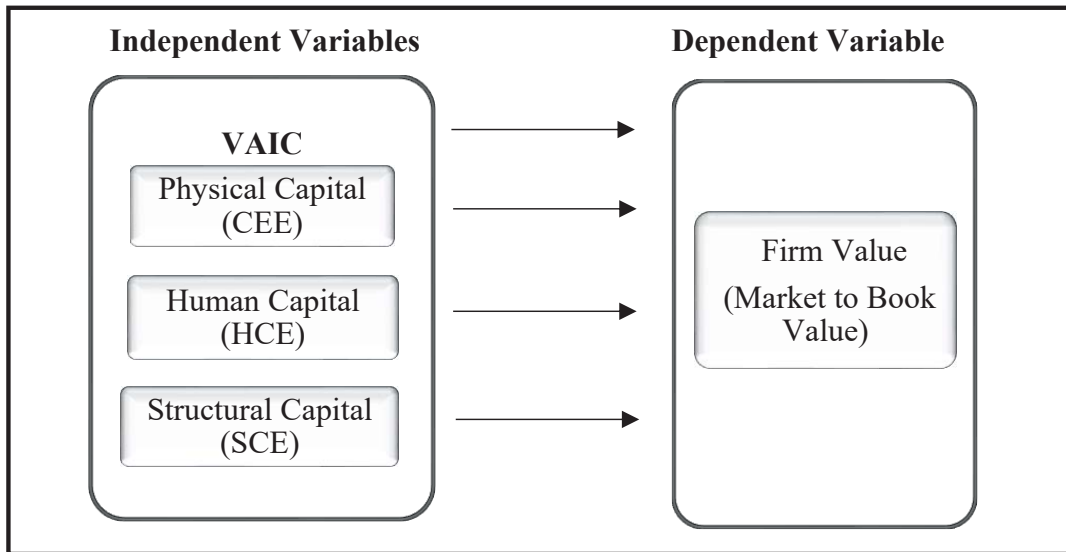
According to Maditinos et al. (2011), MB value can be computed as the follows.

Market value of Common stock = Number of shares x Stock price at the

<div align="center">outstanding   end of the year</div>

Book value of Common stock   = Total assets – Total liabilities

Market to Book value   = Market value / Book value

3.4. Conceptual Framework

Source: Author compiled

Figure 01: Conceptual Framework

Following formulas have been used to measure the dependent and independent variables.

3.4. The Development of hypotheses

According to the literature which were discussed in previous sections, most researchers have revealed that Intellectual capital has a positive impact on the firm value of an organization. Therefore, the following hypotheses can be outlined.

H1 - There is a positive impact of Intellectual Capital on Firm Value in Consumer Service Industry and Capital Goods Industry

H2 - There is a positive impact of Human Capital on Firm Value in Consumer Service Industry and Capital Goods Industry

H3 - There is a positive impact of Structural Capital on Firm Value in Consumer Service Industry and Capital Goods Industry

H4 - There is a positive impact of Capital Employed on Firm Value in Consumer Service Industry and Capital Goods Industry

Therefore, by using above hypotheses, the study used different statistical models such as descriptive statistics, correlation analysis and regression analysis to investigate the impact of Intellectual capital on firm value. Thereby, the study employed the following regression equations.

$$MB = b_0 + b_1 (VAIC) + e \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots1$$

$$MB = b_0 + b_1 (CEE) + b_2 (HCE) + b_3 (SCE) + e \dots\dots\dots\dots\dots\dots\dots2$$

Where,

$\beta0$	=	Intercept
$\beta1 - \beta3$	=	Slope
MB	=	Market to Book Value
VAIC	=	Value-added Intellectual Coefficient
HCE	=	Human Capital Efficiency
SCE	=	Structural Capital Efficiency
CEE	=	Capital Employed Efficiency

The study has been used Stata-13 software to run the regression models and to test hypotheses. As indicated in the above paragraph, the mentioned hypotheses of the study were tested using two regression models and it is as follows.

Model 01 – Intellectual Capital and firm value

Model 02 – Components of Intellectual Capital and firm value

The statistical models called descriptive statistics and correlation analysis were run and completed before perform the regression analysis. Thereafter, all other diagnostic tests for data were done, including stationarity, multicollinearity, and autocorrelation. In addition, the Housman test was done to determine which regression model is suitable to evaluate the panel data in the study. The test results and their implications, are presented in the below section.

4. FINDINGS AND DISCUSSION

According to the descriptive statistics (Table 01) calculated with raw data in the consumer service sector, the values of mean, standard deviation, minimum and the maximum of each variable is shown as follows. Skewness is an asymmetry of a data set that deviates from normal distribution and all variables shows a normal distribution, because the skewness value of all variables is lying between +2 and -2. Kurtosis is the measurement of the sharpness of the peak or flatness of the series' distribution. Thereby, the kurtosis values of all the variables are less than 5 and, all are normally distributed.

Table 01: Descriptive Statistics - Consumer Service Sector

	MB	VAIC	CEE	HCE	SCE
Mean	0.871779	3.490364	0.0993282	2.88931	0.5611717
Std. Devi.	0.6835041	1.717861	0.0745914	2.056274	0.2745671
Min	0.1531559	0.8760424	0.0006144	0.034565	-0.069334
Max	2.624828	6.96953	0.2591349	8.749709	0.9564491
Skewness	1.323337	0.5586833	0.6493915	1.369907	-0.841713
Kurtosis	3.724216	2.614959	2.444731	4.795936	3.045208

Source: Author Compiled

In addition, the descriptive statistics (Table 02) in the capital goods sector, all variables are normally distributed with skewness between +2 and -2, and the kurtosis is less than 5.

Table 02: Descriptive Statistics - Capital Goods Sector

	MB	VAIC	CEE	HCE	SCE
Mean	1.142964	7.407022	0.1431452	6.588765	0.6806574
Std. Devi.	0.6919436	7.111654	0.077308	6.978119	0.2256978
Min	0.0140353	0.9441958	0.0080522	0.9209498	-0.032437
Max	2.479253	23.52907	0.4205905	22.50056	0.9948386
Skewness	0.5831979	1.443726	0.5731149	1.471372	-1.011145
Kurtosis	2.262266	3.525273	3.610775	3.576067	4.361877

Source: Author Compiled

The Correlation analysis identifies how dependent and independent variables are moved and directed to each other, the association between variables and the relationship between variables and their strength. The result of correlation analysis ranges from +1 to -1. Plus (+) or minus (-) signs denote the moving direction of the variables. Appendix 01 presents the result of correlation analysis between MB and VAIC in the consumer service sector as 0.1872 and a weak positive relationship. Further, there is a weak positive correlation of HCE and SCE with MB and a moderate positive correlation of CEE with MB. As shown in Appendix 02, there is a moderate positive relationship of VAIC with MB and a weak positive relationship of CEE with MB and HCE and SCE has a moderate positive relationship with MB of the companies in the capital goods sector.

Multicollinearity is the condition where the independent variables are related to each other. According to the OLS assumption, there should not be perfect multicollinearity among the variables. That is there is no perfect linear relationship among the

independent variables in the model. To test the multicollinearity, Pearson's correlation matrix was used and if the correlation coefficient is greater than 0.8 (80%) between independent variables, then there is a multicollinearity issue among the variables (Bozbura, 2004). Based on the above Statistical figures in Appendix 03 and 04, there is no multicollinearity issue among the independent variables in both sectors. Because, the collinearity between 'CEE and HCE', 'SCE and CEE' and 'HCE and SCE' in both sectors are less than 0.8. Hence, all variables in the study are free from the multicollinearity issue.

Autocorrelation is the correlation between observations ordered in time or space. The Durbin Watson test value can be taken as the benchmark to check the autocorrelation. Appendix 05 concludes that the Durbin Watson value of MB with VAIC and MB with CEE, HCE and SCE in the consumer service sector are 2.000275 and 2.113912 respectively. Both values are near to two (2) and then there is no autocorrelation among error terms. The Durbin Watson value of MB with VAIC and MB with CEE, HCE and SCE in the capital goods sector are also very close to two (2) and then there is no autocorrelation. This research is based on panel data which consists both the cross-sectional and time series data. Prior to run the regression model, it should need to test what is the most suitable and appropriate model to run the regression by using Housman Test. It tests whether Fixed Effect Model or the Random Effect model is appropriate. The significant level of chi-square value probability being less than 5%, it can accept the null hypothesis and can reject the alternative hypothesis, which means the fixed effect model is the appropriate model. According to the results shows in Appendix 06, the chi-square value of both models in both sectors are not less than 5 and Random Effect model is appropriate for all.

As per Table 03, the probability value of the F statistics (Prob > Chi2) in the consumer service sector, the overall model is significant in both model 01 and 02. As per regression results, it emphasizes that VAIC and CEE have a positive and significant relationship with the firm value at the 1% level of significance. However, Human Capital Efficiency (HCE) and Structural Capital Efficiency (SCE) are not significant in the model. According to table 04, VAIC shows the p value as 0.020 and it is significant at 5% level and CEE is significant at 1% level in the capital goods sector. However, the other variables, which are HCE and SCE are not show a significant impact on the firm value.

Table 03: Regression Results - Consumer Service Sector

MB	Coefficient	Std. Err	z	P>|z|	[95% Conf. Interval]		Prob > chi2
VAIC	0.07674	0.02707	2.83	0.005	0.5023	0.1298	0.0046
CEE	3.4728	0.7340	4.73	0.000	2.0341	4 .9115	0.0000
HCE	0.0091	0.0241	0.38	0.706	-0.0382	0.05650	0.0000
SCE	0.0133	0.1728	0.08	0.939	-0.3254	0.3520	0.0000

Source: Author Compiled

Table 04: Regression Results - Capital Goods Sector

MB	Coefficient	Std. Err.	z	P>|z|	[95% Conf. Interval]		Prob > chi2
VAIC	0.02093	0.0090	2.33	0.020	0.0032	0.0385	0.0200
CEE	1.9507	0.7474	2.61	0.009	0.4858	3.4156	0.0018
HCE	0.0090	0.0117	0.77	0.438	-0.0139	0.0320	0.0018
SCE	0.2871	0.3295	0.87	0.384	-0.3587	0.9331	0.0018

Source: Author Compiled

In literature, most researchers have investigated a positive impact of intellectual capital on firm value (Wudhikarn and Zeng, 2010; Kehelwalatenna and Gunaratne, 2010) and few others revealed a negative impact of intellectual capital on firm value (Hamdan, 2017; Iranmahd et al. 2014). The research reveals a positive impact of CEE on firm value and the previous researchers also investigated that result in their studies (Yilmaz and Acar, 2018; Janošević, 2015). As per studies done by Janošević (2015) and Bozbura (2004), there is no impact of SCE on firm value and the results and findings of this study confirm it. However, the study reveals HC is not a significant impact on firm value, previous researchers investigated a positive impact on it (Fanni and Fuad, 2019; Bozbura, 2004).

5. CONCLUSION

Most studies (Kehelwalatenna and Gunaratne, 2010; Nguyen and Doan, 2020 and Nimtrakoon, 2014) reveal that there is a positive impact between IC and the firm value. Thereby, this study also supports that findings with the positive impact of IC on the firm value. However, some others (Hamdan, 2017 and Mehralian et al. 2012) reveal a negative impact. When testing the component wise impact, Kehelwalatenna and Gunaratne (2010) revealed a positive impact of CEE on firm value. The finding of this study also shows a positive impact of CEE on firm value. As per findings of Kehelwalatenna and Gunaratne (2010) and Fanni and Fuad (2019), SCE has not a positive impact on the firm value, and it is same as the findings in this study and HCE has a positive impact, but it is differed with the findings of the study.

Based on the findings of analysis, it concludes that there is a positive impact of intellectual capital on the firm value in both the consumer service sector and the capital goods sector. Further, it reveals that there is a positive impact of capital employed on firm value in both the consumer service industry and capital goods industry. It shows that, both sectors have efficiently managed their physical assets and otherwise, companies could not get best results from their assets. However, the result of the study shows that there is no positive impact of human capital efficiency and structural capital efficiency on the firm value in both sectors. Hence, this study was able to achieve objectives that stated above.

The summary of the developed hypotheses is presented in Table 05.

Table 05: Decision Summary

Hypotheses	Consumer Service		Capital Goods	
	P value	Decision	P value	Decision
H1 - There is a positive impact of Intellectual Capital on Firm Value	0.005	Accepted	0.020	Accepted
H2 - There is a positive impact of Human Capital on Firm Value	0.706	Rejected	0.438	Rejected
H3 - There is a positive impact of Structural Capital on Firm Value	0.939	Rejected	0.384	Rejected
H4 - There is a positive impact of Capital Employed on Firm Value	0.000	Accepted	0.009	Accepted

Source: Author Compiled

In addition, the study was targeted to investigate the impact of intellectual capital on firm value as a comparison between two sectors in CSE Sri Lanka. Those two sectors are selected based on the employment of human capital. Hence it is selected the Consumer Service sector which is highly related to human capital and the Capital Goods Sector, which is highly related to physical assets than human capital. However, both sectors show the same results in this study. Though Consumer Service Sector is highly related to human capital, the results expose that there is no significant impact of human capital on firm value. Hence intellectual capital in both sectors shows a significant impact on firm value. Further, components of intellectual capital in both sectors also present the same results in this study. Hence it concludes that, though there is a difference between the two sectors, mainly the employment of human capital, there is no difference in the intellectual capital impact on the firm value in both Consumer Service Sector and Capital Goods Sector companies in CSE Sri Lanka.

Based on the results and findings, it is better to invest more in intellectual capital to get more competitive advantages, and it will support companies to get higher firm value. Though structural capital and human capital have no significant impact on the firm value in both the consumer service sector and capital goods sector corporates can concern more on it to increase their contribution to the firm value. Hence, corporates can invest more in training, monitoring performance, define job responsibilities and motivate employees to increase human capital efficiency and should strengthen existing intangible structures such as systems, routines, procedures, databases, and culture of the organization to increase the contribution of structural capital on firm value and to get more competitive advantages.

Further, this study suggests some suggestions for future studies as well. Therefore, it suggests future researchers to conduct research by using the Modified Value-Added Intellectual Coefficient method. Because, the MVAIC method considers the other component of IC; relational capital efficiency as a part of the model. In addition, it is better to broadening the size of sample and time-period to get a better picture

regarding the impact of Intellectual Capital on firm value in Sri Lankan context. If future researchers can collect research data from both primary and secondary sources, the study may give a more accurate conclusion on the study. Further, it suggests future studies to be done on the impact of intellectual capital on firm value selecting companies fairly in various business sectors in Sri Lankan context or in more countries.

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ANNEXURES

Appendix 01 - Correlation Analysis - Consumer Service Sector

	MB	CEE	HCE	SCE
MB	1.0000			
CEE	0.4208	1.0000		
HCE	0.1551	0.1201	1.0000	
SCE	0.1779	0.0617	0.6318	1.0000

	MB	VAIC
MB	1.0000	
VAIC	0.1872	1.0000

Appendix 02 - Correlation Analysis - Capital Goods Sector

	MB	CEE	HCE	SCE
MB	1.0000			
CEE	0.0528	1.0000		
HCE	0.4015	-0.2899	1.0000	
SCE	0.3909	-0.2540	0.7325	1.0000

	MB	VAIC
MB	1.0000	
VAIC	0.4054	1.0000

Appendix 03 - Multicollinearity - Consumer Service Sector

	CEE	HCE	SCE
CEE	1.0000		
HCE	0.1201	1.0000	
SCE	0.0617	0.6318	1.0000

Appendix 04 - Multicollinearity - Capital Goods Sector

	CEE	HCE	SCE
CEE	1.0000		
HCE	-0.2899	1.0000	
SCE	-0.2540	0.7325	1.0000

Appendix 05-   Autocorrelation

Durbin Watson Statistics

	Consumer Service	Capital Goods
Model 01	2.000275	1.909896
Model 02	2.113912	1.974112

Appendix 06-   Hausman Test

	Consumer Service		Capital Goods	
	chi2	Prob>chi2	chi2	Prob>chi2
Model 01	0.00	0.9637	2.42	0.1200
Model 02	1.74	0.6292	1.14	0.6593