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Unveiling the Nexus Between Intellectual Capital Efficiency and Financial Performance in Malaysia's Healthcare Sector Amidst the Covid-19 Crisis

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Abstract: Intellectual capital is a vital element in strategic resources and enhances the productivity of companies in the knowledge-based economy. However, during the COVID-19 pandemic, most of the sectors in Malaysia are affected by staff and apply knowledge-based processes and procedures. The study aims to assess the influence of intellectual capital (IC) efficiency on financial performance in Malaysia's healthcare system during the COVID-19 pandemic. The VAIC technique was used in the study, as well as panel data analysis with STATA 14. The sample was drawn from three (3) years of healthcare annual reports, spanning 2019 to 2021. Eleven (11) healthcare companies were chosen because they have the capacity to develop public healthcare services and provide high-quality medical facilities. The findings for VAIC ranking show Hartalega, the main producer of disposable gloves marked as the highest ranking of efficiency and the least efficient is TMC Life. For panel data analysis, the results exhibit value-added human capital (VAHU) and value-added capital employed (VACA) are observed to have a significant and positive relationship with the dependent variable; Return on Equity (ROE). Human capital and capital employed are considered the most efficient resources to generate profit and the vital elements in the Malaysian healthcare sector to combat the COVID-19 pandemic. This study contributed to the body of knowledge in the Malaysian healthcare sector about intellectual capital literature. Malaysian healthcare organizations can benefit from incorporating more intellectual capital into their operations to preserve long-term development progress.

Keywords: *Intellectual capital, Malaysian healthcare sector, Covid-19 pandemic.*

1. Introduction

In today's knowledge-based economy, intellectual capital has been identified as an essential component for increasing productivity and maintaining organizational performance. The knowledge-based economy requires more information technology, skills, and knowledge from employees than tangible assets. The shift from an industrial to a knowledge-based economy represents how value is created within an organization. Intellectual capital assets are the intangible assets that contribute to a firm's bottom line. According to empirical data, intangibles are critical to fostering corporate performance. This indicates that strategic resources must be available regardless of a company's asset portfolio size (Denicolai et al., 2015). As a result, strategic management of these intangible assets is an important focus of our research. As a result, organizations that grasp the concept of intellectual capital are more likely to thrive because they realize its significance and continually update their knowledge and skills to compete with others (Huffman, 2012). The global healthcare industry is one of the most active and rapidly expanding sectors of the global economy. People's increased awareness of health has propelled the health business to become a major engine of economic growth.

Healthcare is a wealth generator, and national healthcare costs are rising dramatically. Aside from organic expansion in services, pharmaceuticals, and medical equipment, the healthcare sector explored new boundaries in services, clinical research, health tourism, and generic pharmaceutical manufacturing. According to the International Trade Administration (2022), Malaysia's healthcare expenditures are expected to increase to $28 billion by 2028. The government has allocated $7.7 billion to the Ministry of Health for operations and development expenses to prioritize public healthcare in preparation for COVID-19's endemic phase. The healthcare sector has grown in importance since it has a large potential for sustainable growth and as a platform for medical tourism hubs. The novel's emergence as a global epidemic has generated the need for environmental, health, and economic. In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. Wang, Horby, and Hayden (2020) characterize the COVID-19 outbreak as a public health threat with serious health, environmental, and economic consequences. The World Health Organization received the first confirmed case of the novel coronavirus, which was initially diagnosed as 'pneumonia with unknown etiology'.

The pandemic started in a seafood market in Wuhan, China, and spread rapidly across countries through human-to-human transmission and community expansion (Sarkodie and Owusu, 2020). In the history of COVID-19, the United States has been identified as having the highest number of confirmed cases (938, 154) and deaths (53,755) across 183 countries, followed by Spain (223,759 confirmed cases and 22,902 deaths) and Italy (195, 351 confirmed cases and 26,384 deaths) (Lauren, 2020). According to Ahir et al. (2020), the coronavirus has caused more global anxiety and pandemic uncertainty than SARS (2002), Avian flu (2003), Swine flu (2009), or Ebola (2014). Several interventions are implemented during the period to control the spread of COVID-19 (Gautam and Hens, 2020). This includes quarantine, travel bans, restrictions, social distance enforcement, public place closures, and public event cancellations. The COVID-19 pandemic has had a substantial and varied influence on the global healthcare sector. COVID-19 caused an unusual rise in demand for healthcare services, particularly in areas extensively impacted by the virus. Hospitals and healthcare facilities struggled to manage the patient influx, resulting in overcrowded emergency rooms and shortages of beds, equipment, and medical personnel. Healthcare systems around the world encountered financial issues as a result of increased spending on COVID-19 response activities, lost revenue from cancelled procedures, and lower patient volumes for non-COVID treatment.

Many hospitals and healthcare facilities battled to stay financially viable, resulting in layoffs, furloughs, and closures in some circumstances. Containment efforts were implemented to prevent the health consequences of the global pandemic, which impacted the sustainability of the environment and economic development. Overall, this disease has impacted global markets, and it will be considered an unprecedented event affect that forced many businesses to shut down their operations. Corporations were forced, and continue to be compelled in certain ways, to operate without the ability to use their physical assets to drive firm performance. As a result, despite a debilitating economic situation, they rely on leveraging their intellectual capital at an unseen level to continue fueling business success. The outbreak has been a new experience for Malaysia, particularly with the implementation of a large-scale public health and social measure known as the Movement Control Order (MCO). Malaysia's healthcare system is separated into two areas: public health and medicine. Malaysians experienced strong emotions at the onset of the outbreak, with much uncertainty about the pandemic's outcome as the world witnessed dangerously high COVID-19 mortality. Furthermore, Malaysia has concluded the second wave of diseases. The lessons learned thus far have helped the country's healthcare system become more vigilant and prepared for future pandemics. To meet the demand for COVID-19 screening, more healthcare personnel are involved in COVID-19 patient care, more laboratory services are used, and efficient clinical management is necessary (Amaran, Kamaruzaman, Esa, & Sulaiman, 2021).

Apparently, the healthcare sector utilizes in-house resources for their business operations as the intellectual capital elements (procedures, systems, processes, knowledge, experiences, and expertise) are the performance indicators for the healthcare sector. A need to analyze the IC efficiency in the Malaysian healthcare sector during the pandemic because more expenditure is forced to be made and the sector should use all available resources to survive the increase in COVID-19 cases. The situation deteriorated as the healthcare industry confronted a scarcity of healthcare personnel (nurses and doctors). The healthcare sector as well as the government can cut costs and increase profits by utilizing the IC component, especially in the face of an unusual catastrophe. As a result, the purpose of this research is to examine the impact of IC efficiency on financial performance in the Malaysian healthcare industry during the COVID-19 pandemic, as they are facing severe circumstances and need to survive to keep a competitive advantage. The novelty of this study is that it evaluates and analyzes IC efficiency performance on the financial performance of the Malaysian healthcare sector during a crisis period or unprecedented event. In fact, the study demonstrated the beauty of the VAIC approach, which is regarded as the greatest instrument for evaluating IC performance and is beneficial as well as critical to investors and corporate firms in making decisions. Moreover, it also determines the strength of IC resources for their organizations to maintain competitive advantages as well as for sustainable development and growth in the healthcare sector.

Value Added as an Indicator of IC (the VAIC method): The VAICTM method enables the organization to evaluate the effectiveness of its value generation (Pulic 2001, 2002). The VAICTM approach used a company's financial statements to compute the efficiency coefficient for three types of capital: human capital, structural capital, and capital employed. Although VAICTM employs accounting data, it is unconcerned about the firm's costs. According to Pulic (2000), VAIC focuses on resource efficiency, which adds value to the firm. Pulic (1998)

introduced the Value-Added Intellectual Coefficient (VAIC) as an indirect measure of the effectiveness of corporate Intellectual Capital value addition. VAIC has been identified as a significant component of financial capital (monetary and physical), human capital, and structural capital. Since VAIC is calculated as the sum of capital employed efficiency human capital efficiency and structural capital efficiency, a higher number for VAIC indicates greater efficiency in the use of company capital. According to Pulic (2001), a firm's market value is formed by capital employed (physical and financial) and intellectual capital assets that can be used to generate value for a company. According to Basyar (2012), some of the main reasons for using VAIC are: 1) VAIC is derived from audited data, so the results are more objective and verifiable; 2) VAIC provides a consistent and standardized measure; and 3) VAIC is an analytical procedure that allows for the evaluation and monitoring of value-added efficiency with total resources and each major resource category.

2. Literature Review

Intellectual Capital: Many scholars from all around the world have studied intellectual capital in a variety of contexts. According to Guthrie et al. (2012), intellectual capital is evolving and growing in terms of both the number of articles published and scholars investigating it. Critical IC research is also growing, which results in a better knowledge of how IC operates (Dumay and Garanina, 2013). Intellectual capital (IC) is described as knowledge that is used to generate profit and provide value to businesses (Harrison & Sullivan, 2000). The majority of studies (Chen et al. 2005; Clarke et al. 2011; Nadeem et al. 2019) found that IC helps companies perform better. However, opinions differ on how it affects corporate performance during an economic slump. Morariu (2014) observed that the relationship between IC and profitability deteriorated during the 2008 financial crisis. According to Nadeem et al. (2019), the IC of companies remains constant during the financial crisis, assisting businesses in weathering the economic downturn. Kehelwalatenna (2016), on the other hand, found that IC improved productivity during the 2008 economic collapse. The contradictions of the IC study during the crisis have resulted in differing points of view. Today, intellectual capital is a valued resource in business, garnering the attention of executives, investors, and legislators (Edvinsson & Malone, 1997). Low and Kalafut (2002) defined intellectual capital (IC) as an intangible asset that contributes to a company's competitive advantage and includes specific technology, customer knowledge, brand name, reputation, and corporate culture.

Bontis et al. (2000) conducted the first empirical study on intellectual capital performance in Malaysia. They concentrated on the interaction of intellectual capital in Malaysia's service and non-service industries. Furthermore, Goh (2005) investigated IC performance. Between 2001 and 2002, Goh (2005) sought to assess the IC performance of ten (10) domestic and six (6) international commercial banks. According to the study, human capital efficiency (HC) accounts for almost 80% of the value creation capability (VAIC in value) of both domestic and foreign banks, as opposed to structural capital efficiency (SC) and capital employed efficiency (CEE). Based on the previous studies, this indicates that IC performance is a vital element in strategic resources of corporate firms to generate profit and create value added. With respect to the IC perspective, the resource-based view (RBV) is the main theory to explain the development of intellectual capital (IC). The RBV of the firm focuses on the inside, which includes its resources and capabilities, to explain the organization's profit and worth (Penrose, 1980). This hypothesis is defined by Hoopes et al. (2003) as disparities in performance within an industry. This occurs when successful organizations have significant resources that others do not (Wernerfelt, 1984). The RBV also serves as a strategic line of thought for the organization, analyzing its strengths and limitations.

Value Added Intellectual Capital (VAIC): VAIC is an important part of intellectual capital since it indicates the company's ability to generate value added (VA). According to Pulic (1998), VA is the most objective way to assess a company's success and potential for value creation. In this case, Maditinos et al. (2011) stated that the greater the value of intellectual capital (VAIC), the more efficient the utilization of corporate capital is, resulting in VA for the company. Pitelli Britto, Monetti, and da Rocha Lima Jr. (2014) studied whether IC elements or standard accounting efficiency criteria may better assess value generation in Brazilian real estate firms. Except for capital utilization efficiency, they identified an inverse correlation between IC and market value, implying that firms with higher values demonstrated lower levels of IC. The difference between income and expense is the value added in this scenario.

The VAIC model assesses IC by measuring three (3) components: capital employed efficiency (VACA), human capital efficiency (VAHU), and structural capital efficiency (STVA). Human capital is based on numerous types of knowledge, including skills, experience, training, and expertise. This is consistent with the premise that existing knowledge leads to organizational excellence. Structural capital refers to the processes and procedures that are created by and stored in a firm's technology system that speed the flow of knowledge through the organization (Youndt, Subramaniam, & Snell 2004). Moreover, VACA is a physical and financial asset that contributes to the efficiency of the firm and generates profit. As a result, the larger the value of VAIC, the better the potential utilization of firm value development.

Intellectual Capital and Financial Performance: The majority of the researchers firmly believed that IC had a favorable impact on the financial performance of the company (Chen et al, 2005; Ozkan, Cakan, and Kayacan, 2017; Smriti et al. 2018). This is defined as profitability with the assumption that invested capital can earn a specific level of profit. According to Chen et al. (2005), if IC is a useful resource for a company's competitive edge, it will contribute to the company's financial performance. IC is critical to increasing the value of a firm or its financial performance. Companies that can efficiently use their IC can boost their company's market worth. Furthermore, Riahi and Belkaoiu (2003) documented that IC is highly associated with multinational company performance in the United States, lending support to the resource-based theory and stakeholder theory. Furthermore, Pasaribu, Purnamasari, and Hapsari (2012) discovered an effect of VAIC on financial performance as a proxy for return on equity (ROE), earning per share (EPS), asset turnover (ATO), price to equity ratio (PER), and growth rate (GR) using a sample of manufacturing companies listed on the Indonesian stock exchange from 2006 to 2008. In addition to ROA, additional proxies can be used to reflect financial performance to examine the relationship between intellectual capital and corporate performance.

These research findings are also consistent with theories (resources-based theory), which describe how valuable resources in an organization contribute to the company's competitive advantage as well as superior financial performance. Human capital refers to the human part of an organization, such as a combination of talents, qualifications, and knowledge that gives each character (Bontis, Dragonetti, Jacobsen, and Roos, 1999). Human capital efficiency is critical for Malaysia's competitiveness and economic performance. It decides how much the country can leverage its workforce's skills and knowledge to promote productivity, innovation, and inclusive growth. From the perspective of the healthcare sector, organizations can improve the quality of care they deliver by incorporating value-added human capital, such as competent healthcare personnel. Improved care quality may result in better patient outcomes, enhanced patient satisfaction, and, ultimately, better financial performance due to factors such as higher patient retention rates and favorable word-of-mouth referrals. Sarwar (2014) supports this, finding that the quality of patient treatment is the most important element in patient satisfaction in Malaysian private healthcare. The findings revealed that patient satisfaction resulted a good financial performance as the healthcare staff were efficient in their service.

Well-trained and motivated healthcare professionals can help improve efficiency and productivity in healthcare facilities. This can lead to cost savings, less waste, and more efficient resource utilization, all of which can improve financial performance. Zula (2007) believed that if management focused more on human capital efficiency, it would reduce admission and waiting time in hospitals, increase budgeting, reduce costs, and enhance hospital performance. Another study done by Rahim, Kamaluddin, and Atan (2018) revealed that human capital efficiency has a significant and positive relationship with financial performance (ROE). Capital employed is the total amount of funds invested in a business, including equity and long-term debt, which are used to generate profits. Another definition given by Izzo, Tomnyuk, and Lombardo (2022), capital employed is the amount of capital to generate profits, which can improve company performance. In the healthcare sector, it can be considered an investment in hospital buildings, medical equipment, and technology infrastructure. A well-equipped healthcare facility can attract patients and healthcare professionals, which can positively impact financial performance. Many studies have proven that capital-employed efficiency has a significant and positive relationship with financial performance. Smriti and Das (2018), Chen et al. (2005) and Tiwari (2022) found that capital employed has a significant effect on financial performance. Effective management of capital resources is critical for long-term financial success in the healthcare industry.

Intellectual Capital and Healthcare Sector: Healthcare organizations have a distinct business model that distinguishes them from other industries. The expertise, skills, and experiences of the workforce are the most

valuable assets for a healthcare organization. Based on Evans, Brown, and Baker (2015), intangible resources derived from internal and external constitute intellectual capital in healthcare facilities and companies. Covell and Sidani (2012), on the other hand, revealed that IC can be defined as a repository of physicians' and nurses' expertise within an organization. Furthermore, much of IC in healthcare organizations focuses on measuring rather than controlling (Kim and Chung, 2012). According to Veltri, Bronzetti, and Sicoli (2011), little research has been conducted on how to systematically manage IC and what techniques can be employed to harness IC inside and across the healthcare industry. In another study done by Habersam and Piber (2003), IC is well-recognized in hospitals, and its measurement and treatment are crucial. The labor of highly trained and talented personnel caring for patients in need of specialized healthcare is reflected in HC within hospitals (Mohamedi and Ghorbanhosseini, 2015). Doctors and nurses are referred to as registered experts in theory and practice based on academic education, participation in continuing professional development activities, specialty training, and work experience (Mohamedi & Ghorbanhosseini 2015). Organizational process efficiency, databases, information, and manufacturing technologies are all examples of structural capital (Cohen & Kaimenakis 2007). This IC component is also known as HC's embodiment, empowerment, and enabling infrastructure (Bontis 1998). SC refers to the structural capital or resources in hospitals that include medical and nursing information, practice guidelines, and protocols that are used to help clinicians apply their knowledge and expertise in patient care. Consequently, further research is imperative, particularly within the Malaysian context, to identify strategies managers can utilize to enhance, implement, refine, and leverage intellectual capital within healthcare organizations.

Methodology: With respect to panel data analysis, the dependent variable in this study is the return on equity (ROE), which refers to the return to shareholders of common shares and is commonly used as a financial indicator for investors. In addition, the independent variables of the study are VAHU, STVA, and VACA. The three (3) IC parameters; VAHU, STVA, and VACA will be regressed simultaneously to see which parameters led to efficiency and profitability for the firm during the COVID-19 pandemic. The following are the measurements for each parameter:

Table 1: Measurement and Variables

Dependent Variable (Financial performance)	**Measurement**
ROE (Return on Equity)	Net profit/ total equity (Chen et. al, 2005; Xu et al, 2017; Xu and Wang, 2019)
Independent Variable (IC Parameters)	
VAIC (Value Added Intellectual Coefficient)	VAIN + VACA (Zeghal and Maaloul, 2010)
VAHU (Value Added Human Capital)	VA/HC (Zeghal and Maaloul, 2010)
STVA (Value Added Structural capital)	SC/VA (Zeghal and Maaloul, 2010)
VACA (Value Added Capital Employed)	VA/CA (Chen et. Al, 2005; Zeghal and Maaloul, 2010)
VAIN (Value Added Intellectual capital)	VAHU + STVA (Zeghal and Maaloul, 2010)

3. Research Methodology

Data Collection and Sample Selection: To examine the influence of IC on financial performance in the Malaysian healthcare sector, data were acquired from the annual reports of eleven (11) healthcare firms named Kotra, Hartalega, Supermax, Kossan Rubber, Top Glove, DuoPharma, Apex, Pharmaniaga, Adventa, KPJ Bhd, and TMC Life. The companies have been chosen as samples due to their consistency in generating profits during the COVID-19 pandemic as well as the availability of the data. Data was collected from 2019 to 2021 to evaluate the efficiency of IC during the COVID-19 pandemic, as it happened within the year. The Malaysian healthcare sector was chosen as an example since it was the most significant and afflicted sector during the COVID-19 outbreak.

VAIC Method: According to Zeghal and Maaloul (2010), the VAIC method presents several steps to perform VA from all the IC resources. The first step is to calculate the company's ability to create VA. Based on stakeholder theory (Riahi-Belkaoui, 2003), the VA is calculated as follows:

VA = OUTPUT - INPUT (1)

Where Outputs (OUT) represent income and include all items and services offered in the market; inputs (IN) include all expenses for running a business, excluding staff costs, which are not considered costs. The next step is to identify the relationship between VA and HC. The value-added human capital coefficient (VAHU) calculates how much value one financial unit invests in its people. Pulic (2004) regards employee costs as an indicator of HC. These costs are no longer included in the inputs. This suggests that personnel expenses are seen as an investment rather than a cost. As a result, the relationship between VA and HC reveals HC's potential to produce value in a company:

VAHU = VA/HC (2)

The third stage is to investigate the connection between VA and SC. The structural capital value-added coefficient (STVA) measures the contribution of SC to value generation. According to Pulic (2004), SC is obtained by subtracting HC from VA. SC is a dependent indicator on the generated VA and is proportional to HC. As a result, the higher the HC in the produced VA, the lower the share of SC. As a result, the relationship between Value Added (VA) and Structural capital (SC) is determined as follows:

STVA = SC/VA (3)

The fourth step is to calculate the value-added intellectual capital coefficient (VAIN), which demonstrates the role of IC in value creation. The VAIN is calculated by adding the VAHU and STVA:

VAIN = VAHU + STVA (4)

The fifth stage is to determine the relationship between VA and both physical and financial capital employed (CA). IC cannot generate value on its own, according to Pulic (2004). As a result, it is critical to consider both financial and physical capital to gain a complete picture of the VA generated by a company's resources. The value-added capital employed coefficient (VACA) calculates the additional value generated by one monetary unit invested in capital employed. As a result, the relationship between VA and CA illustrates the ability of capital to produce value in a company:

VACA = VA/CA (5)

The sixth phase involves assessing each resource that contributes to the establishment or production of VA. As a result, VAIC determines how much new value is created per monetary unit spent on each resource. A high coefficient indicates that a company's resources, particularly its IC, are being exploited to generate additional value. As a result, the VAIC is computed as follows:

VAIC = VAIN + VACA (6)

Panel Data Analysis: To determine the presence of the most efficient factor, the study employs two (2) methodologies, including the VAIC method and panel data analysis with the statistical program STATA 14. As a result, the research employed descriptive statistics, correlation analysis, diagnostic test panel specification test; fixed effect model and random effect model using static panel data model.

4. Results and Discussion

Value Added Intellectual Coefficient (VAIC) Method

Table 2: Value Added Intellectual Coefficient (VAIC) Method – VAIC Ranking

Company	VAIC
HARTALEGA	77.167
SUPERMAX	10.545
KOSSAN RUBBER	5.308
TOP GLOVE	3.925
DUOPHARMA	3.44
APEX	3.419
PHARMANIAGA	3.178
ADVENTA	2.509
KPJ	1.975

KOTRA	0.016
TMC LIFE	-0.759

Malaysian healthcare companies can be ranked from highest to lowest in terms of value-added intellectual coefficient (VAIC). The highest VAIC represents the company's highest level of efficiency in using all components of intellectual capital, including human capital, structural capital, and capital employed. Thus, VAIC depicts the contribution of all enterprises in investing RM1 in intangible assets. Table 2 shows the value-added Intellectual Coefficient (VAIC) ranking for Malaysian publicly listed companies in the healthcare sector from 2019 until 2021. Based on the table and the VAIC ranking, it shows Hartalega is at the top of the list with a VAIC of 77.167, followed by Supermax, which indicates 10.545. It implies that Hartalega contributed RM 77.167 million from intellectual capital efficiency (human capital, structural capital, and capital employed) for every RM 1 value invested in an organization. As a result, Hartalega was recognized as the most efficient company in utilizing its intangible assets to create profit during the COVID-19 epidemic. Supermax came in second position for VAIC, which indicates that for every RM1 spent in an organization, RM10.545 million was earned from intellectual capital. In addition, Kossan Rubber also ranks third in the VAIC ranking of Malaysian healthcare companies, which shows 5.308. It means for every RM 1 value invested in an organization, RM 5.308 million is created from the intellectual capital component.

It demonstrated that the companies (Hartalega, Supermax, and Kossan Rubber) are successful healthcare enterprises in using all of their resources and generating profits while surviving the COVID-19 outbreak because they are the largest makers of disposable gloves in Malaysia. During the pandemic, all Malaysian healthcare facilities will require gloves. TMC Life has the lowest VAIC grade of -0.759, indicating that it is the least efficient in using intellectual capital compared to other companies in the healthcare industry. For every RM1 invested in an organization, TMC Life created RM-0.759 million in intellectual capital. Aside from that, the sixth (6) firms (Kotra, KPJ, Adventa, Pharmaniaga, Top Glove, and Apex) are investing in intellectual capital, which generates between RM 0.016 million and RM 3.9 million for every RM 1 invested. To summarize, the majority of Malaysian healthcare companies use all IC resources to produce profit. During the pandemic, all healthcare companies are fighting for survival to increase profits. Hartalega is the most efficient healthcare company, whereas TMC Life is the least efficient. Different company characteristics and operations have led to the success of the business in confronting difficult times. However, the findings also found that profits gained during COVID-19 in Malaysian healthcare companies were significantly lower than before the epidemic. This suggests that Malaysian healthcare companies are severely impacted by the pandemic.

Descriptive Statistic

Table 3: Descriptive Statistic

	ROE	VAHU	STVA	VACA
Mean	0.113	113.39	0.365	0.229
Standard deviation	0.179	272.55	0.721	0.264
Min	-0.152	0.42	-1.365	0.016
Max	0.8	1022.36	0.999	1.265
Variance	0.032	74282.75	0.520	0.0696
Skewness	2.156	2.573	-1.002	2.188
Kurtosis	8.326	8.158	2.692	8.469
Obs	33	33	33	33

Table 3 exhibited the descriptive statistics in terms of the independent variables (intellectual capital parameters), VAHU, STVA, VACA, and the dependent variable; return on equity (ROE). Based on the table above, the highest mean score is VAHU (113.39), followed by STVA (0.365). The Malaysian healthcare sector had the lowest mean VACA score of 0.229, ranging from 0.016 to 1.265. The dependent variable of ROE shows 0.113, ranging from -0.152 to 0.8. With the 33 observations, the Malaysian healthcare sector exhibited the highest

VAHU mean score, indicating that expertise, skills, and experiences have been recognized as strategic resources in the changing competitive climate nowadays.

Correlation Analysis: Before conducting regression analysis, the study performed correlation analysis. Correlation analysis is useful in identifying the strength and direction of a relationship between two continuous variables. The correlation analysis for Malaysia's healthcare industry is as follows:

Table 4: Correlation Analysis

	ROE	VAHU	STVA	VACA
ROE	1			
VAHU	-0.0745	1		
STVA	0.2344	0.3724*	1	
VACA	0.8417*	-0.1725	0.3575*	1

Table 4 exhibits the correlation analysis between intellectual capital parameters; VAHU, STVA and VACA and financial performance (ROE) for Malaysian healthcare sectors. Intellectual capital (IC) parameter; VACA was found to have a strong positive and significant correlation with ROE which indicates 0.8417. In contrast, VAHU was found to have a negative relationship with ROE (-0.0745). Similar results of weak positive correlation were found between IC parameter STVA and ROE in the healthcare sector. Based on correlation analysis, VACA (value added capital employed) has a strong relationship with ROE (return on equity) which is significant at the 0.10 level of confidence.

Panel Data Analysis

Panel Specification Tests: In this study, the following is the result of the Hausman test; the decision to choose the Fixed Effect or Random Effect model was used to analyze the data as proposed and explained by Park (2011).

Table 5: Panel Specification Test

Hausman		Appropriate Model
chibar2	p-value	
2.84	41.74	Random effect (RE)

Table 5 addresses the panel specification test and the Hausman test for all IC components (VAHU, STVA, and VACA). The chart also explained the Hausman test, which is critical when deciding between the Fixed Effect and Random Effect models. According to the results, the p-values for all IC components are greater than 0.05. As a result, Ho is accepted, and the best-suited model is the random Effect (FE) model. Based on the overall test, the results indicate that the random Effect model is the best model estimator for intellectual capital (VAHU, STVA, and VACA) and financial performance in Malaysia's healthcare industry.

Diagnostic Tests: Linear Regression: Based on diagnostic tests, the study has conducted three (3) tests which are the multicollinearity test (Variance inflation factors), Heteroskedasticity (Modified Wald Test) and Serial Correlation test (Autocorrelation).

Table 6: Diagnostic Test for Static Model

	P-Values of the Tests		
VIF	H	SC	Strategy
			Random Effect GLS regression with robust option
1.37	-	0.0828	

Table 6 shows the calculated values of variance inflation factors (VIFs) that are less than 10. It indicates that multicollinearity does not appear to be a significant issue in this investigation. In fact, the serial correlation test (autocorrelation) with the Wooldridge test reveals that all IC components have p-values greater than 0.05. It indicates that there is no serial correlation problem in this study. Since the study used a random effect model, the error is considered heteroskedastic. Following Hoechle's (2007) recommendation, the corrective operation was carried out using random effects GLS regression with a robust option. According to the diagnostic tests, the study shows no multicollinearity or serial correlation issues. The solution is based on random effect GLS.

Regression Analysis: Equation:

$$ROEit = -0.0229 + 0.0001VAHU - 0.0233\text{STVA} + 0.5723\text{VACA} + \varepsilon \quad (1)$$

Where; ROE = return on equity, VAHU= value added human capital, STVA= value added structural capital, VACA= Value Added Capital employed, ε = error

Table 7: Regression Analysis

	(1)	(2)	(3)	(4)
VAHU	0.0001	0.0001	0.0001	0.0001**
	(1.23)	(1.42)	(1.23)	(2.45)
STVA	-0.0361	-0.0233	-0.0361	-0.0233
	(-1.23)	(-0.45)	(-1.23)	(-0.29)
VACA	0.6252***	0.5723***	0.6252***	0.5723***
	(8.27)	(6.55)	(8.27)	(5.78)
Constant	-0.0272	-0.0229	-0.0272	-0.0229
	(-1.09)	(-0.73)	(-1.09)	(-0.75)
N	33.0000	33.0000	33.0000	33.0000
r2	0.7278	0.6942		0.6942
r2_a	0.6996	0.4850		0.6626
r2_w		0.6942	0.6882	0.6942
r2_b		0.7738	0.8128	0.7738
r2_o		0.7207	0.7278	0.7207
F	25.8442	14.3773		12.1233
p	0.0000	0.0000	0.0000	0.0011
chi2			77.5325	

Dependent variable: Return on Equity (ROE)
**t* statistics in parentheses
Notes: (1) ROE=Return on Equity, VACA=Capital employed, VAHU=Human Capital, STVA = structural capital. (2) Figures in parenthesis are t-statistic.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 displays the results of regression for the Malaysian healthcare sector (financial performance) using all IC components (VAHU, STVA, and VACA) from Equation 1. Given the different diagnostic tests performed and the corrective processes implemented, it is possible to infer that the analyzed statistical test satisfies the key assumptions of linear regressions. According to the table in Model 4, the independent variables VAHU and VACA have a substantial impact on ROE. The independent variable of value-added human capital (VAHU) has a substantial positive relationship with ROE ($\beta = 0.0001$, $p<0.05$, t-value = 2.45). This indicates that healthcare companies and facilities urgently need more skilled workers, human expertise, and experience to handle the critical situation during the COVID-19 pandemic as the number of cases kept increasing day to day within the period (2019-2021). This is supported by Zigan (2007) and Van Beveren (2003), who argue that healthcare facilities, such as hospitals, must employ and coordinate specialized knowledge, skills, and talents entrenched in their personnel to provide quality treatment to patients. A strong unity among the front-liners (healthcare staff) is urgently required to combat the pandemic while also providing the best quality of service to protect Malaysians from infection. Zula (2007) believed that focusing on human capital efficiency would reduce admission times, hospital wait times, and expenditures, and increase the company's financial performance.

The independent variable of value-added capital employed (VACA) ($\beta= 0.5723$, $p<0.01$, t-value=5.78) shows a positive and significant connection with ROE. This indicates that Malaysian healthcare companies are efficient in utilizing financial and physical assets to support their operations during the COVID-19 pandemic. This is supported by Chen et al. (2005), who found a positive and significant relationship between capital employed and ROE. Apparently, during the pandemic, Malaysian healthcare sectors urgently need capital employed (including government, individual and NGO financial assistance) to cover the cost related to COVID-19 assessment (high technology appliances for COVID-19 test assessment and Intensive Care Unit), materials related to avoiding infection, such as PPE, masks and other healthcare expenditures. In addition, Malaysian healthcare companies are fully utilized and rely more on human capital and capital-employed resources to generate profits and sustain competitive advantage. Surprisingly, STVA (value-added structural capital) is not significant with ROE. This implies that during the pandemic, healthcare companies particularly hospitals and other healthcare facilities put more emphasis on human expertise, skills and collective knowledge from the staff to function rather than focus on structural capital. The empirical models for the healthcare industry explain a significant portion of the variance in ROE, with R-square (overall) values of 0.7207. Independent variables VAHU, STVA, and VACA explain 72.07% of the dependent variables (ROE). The remaining 27.93% will be explained by additional variables not included in this study.

5. Conclusion and Recommendations

Intellectual capital efficiency is increasingly being recognized as a critical component of strategic resources for long-term business competitive advantage. This study provides empirical evidence for healthcare company management to learn that firms with higher intellectual capital efficiency have higher profitability and revenue growth in both current and future years. Even when companies face unusual events such as the COVID-19 epidemic, they can still make profits by utilizing IC resources. The more efficiently IC resources are used, the more profit is generated. Furthermore, investors can place a higher value on organizations with higher intellectual capital efficiency, while also understanding the invisible value of intellectual capital. Healthcare organizations can use IC efficiency resources to become more relevant as medical tourism centers. With the expanding need for innovation, research, and development to improve treatment quality, lower costs, and integrate services, more effective ways for managing and measuring IC are needed both within and within healthcare organizations.

To be more competitive for sustainable development growth, Future studies can add value to the study by comparing pre and post-pandemic financial performance and IC efficiency, as well as incorporating research and development (R&D) characteristics, especially during the crisis time. Because the study only collected data for three (3) years, a longer study period could be used in the future. Using data from Malaysian healthcare companies, our findings have crucial and major consequences for the Malaysian healthcare sector in terms of designing the best strategy and combating other diseases more effectively. The study's findings can help Malaysian investors, politicians, and healthcare companies better understand the influence of intellectual capital on the healthcare sector. There are numerous ramifications for investment decisions, particularly in the intellectual capital components: human capital, structural capital, and capital used.

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