

# Intellectual Capital and Firm Performance: Applying a Modified Value-Added Coefficient

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**Abstract**—Knowledge-based industries base their business processes on intellectual capital. This study, conducted in Southeast Asian countries, examines the influence of intellectual capital on financial performance and market performance of a company in the knowledge-based industry. Intellectual capital is measured using the Modified Value Added Intellectual Coefficient (MVAIC). This study uses a one-year time lag for MVAIC measurements and performance. The sample set consisted of 242 companies. The tests, performed using multiple regressions, analyzed MVAIC and MVAIC components consisting of Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Relational Capital Efficiency (RCE), and Capital Employed Efficiency (CEE). The research showed that intellectual capital (MVAIC) has a positive effect on financial and market performance. The components of MVAIC have different effects; for example, HCE has a positive effect on financial and market performance. This result proves that human capital plays an important role in a company in the knowledge-based industry. SCE has no effect on financial and market performance, RCE has no effect on financial and market performance, and CEE has a positive effect on financial performance and no effect on market performance.

**Keywords**—MVAIC; firm performance; knowledge-based industry; Southeast Asia country

## I. INTRODUCTION

Technology developments have occurred in recent years that cause human beings to be inseparable from technology. Additionally, companies can no longer run in traditional ways but must adapt to technological developments. The development of technology-based businesses became popular and a new opportunity that can be further developed. Companies must also take advantage of technological developments in operating their businesses or risk failure because they cannot keep up with developments. Technology also changes companies based on labor into knowledge-based entities—transforming the characteristics of the company as one that relies on knowledge. This development causes companies to change their view of assets. Assets in physical form, such as land, buildings, and machinery, are still required. However, for a knowledge-based enterprise, intangible assets within the company should receive more attention [1]. An important asset that must be considered is intellectual capital.

Intellectual capital—even without a clear definition—can generally be interpreted as a company's valuable knowledge [2]. In greater detail, intellectual capital can be defined as the

knowledge, practical experience, organizational technology, customer relationships, and professional skills that a company has to compete in the market [3]. Intellectual capital is also defined as the knowledge, information, intellectual property, and experience that each employee in the organization has that is useful for creating opportunities to compete; thus, intellectual capital is a key component of corporate wealth [4]. Because intellectual capital is a key component of corporate wealth, good intellectual capital management and utilization will affect a company's operations, resulting in improvements in its performance. Intellectual capital as a whole has a positive effect on company performance, but the components of intellectual capital cannot be inferred to influence performance given different results [2].

Intellectual capital is important and plays a role in the knowledge-based industry. Intellectual capital items, such as human capital, structural capital, relational capital, and capital employed determine a company's success as reflected in its performance. Research on intellectual capital and company performance has been done by some researchers. Research was conducted by [4] on intellectual capital in relation to performance in the Arab region and found that only the physical capital component influences ROE and ATO, structural and physical capital influences ROA, and human capital influences market performance. Research was conducted by [3] on intellectual capital using company performance and market values in Europe, and they found that human capital is a key factor for corporate welfare, capital employed efficiency has a positive effect on short-term company performance, and structural capital has a positive influence on long-term company performance. Research conducted among countries has also been done by [5] who tested intellectual capital using a company's performance in the global agribusiness industry. The study showed that relational capital of RC and PrC have a positive influence on company performance, innovation capital relates negatively to company performance, and human capital has no effect on company performance. Nimtrakoon [6], conducted research on intellectual capital relations, company performance, and the market value of companies in ASEAN countries.

Different measurements of intellectual capital may result in different research results. The measurement of intellectual capital may use the IC-index [7], HC, RC, InnC, and PrC [5], and the Value Added Intellectual Coefficient (VAIC<sup>TM</sup>) [3, 4, 8]. The most widely used measurement by researchers is the VAIC<sup>TM</sup> developed by Pulic. VAIC<sup>TM</sup> consists of two

components: Intellectual Capital Efficiency (ICE) and Capital Employed Efficiency (CEE). ICE consists of Human Capital Efficiency (HCE) and Structure Capital Efficiency (SCE). This VAIC<sup>TM</sup> was later developed by [9], who added the Relational Capital Efficiency (RCE) variable that is modeled as Modified VAIC (M-VAIC).

This study investigates the effect of intellectual capital on knowledge-based industries with performance in Southeast Asian countries. Previous research stated that a weakness exists in measuring intellectual capital with performance calculated in the same year, whereas a time lag exists between obtaining intellectual capital and the resulting performance. This study considers the time lag using 2016 performance and 2015 intellectual capital. This study used an intellectual capital measurement based on [9] that uses MVAIC. Performance was tested using financial performance and market performance. Intellectual capital among countries was compared, in addition to observing the effect of intellectual capital on performance. Each component of MVAIC also explains its impact on company and market performance.

## II. LITERATURE REVIEW

### A. Resource-based Theory

The resource-based theory views suggest that differences in profitability among organizations can be explained because of differences in resource portfolios and how resources are articulated [10]. Based on Barney (1991) in [10], resource-based theory recognizes assets as an important factor in creating a competitive advantage for achieving good business performance. Today's global marketplace is changing from capital-intensive to knowledge-based, making it important for companies to manage their resources [10]. With the development of knowledge-based industries, traditional performance measurements have been unable to measure and monitor the many dimensions of today's resources because such measurements focus only on financial aspects. New techniques are needed to measure the value of the intangible assets (such as intellectual capital) owned by a company that gives effect to company performance.

The basis of knowledge-based theory can be explored from Penrose [1]. Penrose (1995) in [1] determined that the company's resources are primarily based on a combination of tangible assets and human resources. Resource-based theory helps to understand how organizations achieve a sustainable competitive advantage by using their resources. Barney (1991) in [1] stated that companies can be understood as a collection of physical assets, human capital resources, and organizational resources.

### B. Intellectual Capital

Intellectual capital is an accounting and economic concept. El Tawy et al. [11], stated that the concept of intellectual capital is based on human resource accounting and is then developed in relation to relational, organizational, and structural assets that are largely outside the domain of accounting. The recognition of these assets is reflected in the difference between the accounting book value and the market-based value, mainly related to dot.com and similar companies. These assets are typically characterized in terms

of investing in various intellectual innovations along with related technologies. The importance of these assets is mainly related to the company's competitive advantage [11].

The definition of intellectual capital is not clear. Each researcher has different definitions. Intellectual capital is defined as valuable knowledge for the enterprise (Edvinsson and Malone, 1997 in [2]). Intellectual capital can be defined in greater detail as the knowledge possessed, practice experience, organizational technology, customer relationships, and professional skills that the company has to enable it to compete in the [3].

Intellectual capital is the intellectual material, knowledge, experience, intellectual property, and information that can be used to create wealth [12]. Intellectual capital may also be defined as the sum of all of the knowledge and capabilities possessed by a company that permits it to obtain a sustainable competitive advantage [3]. Brooking (1996) in [5] defined intellectual capital as a combination of intangible market assets, intellectual property, human-centered assets, and infrastructure that enable a company to function.

From the different definitions, intellectual capital can be concluded to have three things that are generally accepted by researchers: component Human Capital (HC), Structural Capital (SC), and Relational Capital (RC) [3]. HC leads to employee knowledge, competence, innovation, commitment, and knowledge. This capital represents an individual's knowledge that is not the property of the company that the employee takes when leaving the company. SC is a strategic asset owned by companies, such as corporate capabilities, culture, processes, patents, copyrights, trademarks, and databases. RC is the knowledge gained through relationships with parties outside the company.

Intellectual capital is an important factor for organizational success in a knowledge-based economy [13]. It is important for organizations to explore and utilize their key intellectual components to improve market competitiveness [13]. Khalique et al. [14], introduced a new concept and incorporated into one model the main components of intellectual capital: human capital, customer capital, structural capital, social capital, technological capital, and spiritual capital.

### C. Intellectual Capital Measurement

Intellectual capital is important but not easy to identify, recognize, and report in financial statements, which may be attributable to the influence of the accounting standards used in each country [6]. Because intellectual capital is not easily identified, its measurement varies. Table I shows variations in intellectual capital measurements once used by researchers. Khalique et al. [14] also stated the measurement of other intellectual capital, which consists of variable intellectual capital—customer capital, social capital, technology capital, and spiritual capital.

Tsakalerou [2], stated that in general, intellectual capital consists of three types of capital: human capital, relational capital, and structural capital. The naming of these three modalities may differ but, in general, these three modalities are accepted as intellectual capital components. HC leads to the inherent knowledge within a person within the organization and within the human resource system. RC leads to knowledge inherent in organizational relationships

with the outside world. SC leads to the inherent knowledge of processes within the organization.

The measurement of intellectual capital that is often used by researchers is the VAIC<sup>TM</sup> model. The VAIC<sup>TM</sup> model was developed by Pulic in 1997 and was designed to accommodate information on value creation efficiency for tangible and intangible assets within the company. VAIC<sup>TM</sup> is an instrument used to measure the performance of corporate intellectual capital. VAIC<sup>TM</sup> is easy and feasible because it can be measured using financial statement figures [9]. Pulic (IBEC, 2003 in [9]) defined two key resources for creating added value in the firm: capital employed and intellectual capital. Intellectual capital contains human capital and structural capital. The added value is the output minus the company's input. Output is revenue from sales and input is all that comes over to the company.

TABLE I. INTELLECTUAL CAPITAL MEASUREMENTS<sup>a</sup>

Authors of Method	Description of Known Method
NICI	A modified version of the Skandia Navigator for nations: national wealth is comprised of financial wealth and IC (human capital + structural capital).
3R model	A model proposing that the IC statements must be integrated by the intellectual capital report, the IC flow report, and the IC memo report.
Danish guidelines	A recommendation by government-sponsored research projects for how Danish businesses should publicly report their intangibles. IC statements consist of a knowledge narrative, a set of management challenges, a number of initiatives, and relevant indicators.
IC-dVAL <sup>TM</sup>	Indicators from four dimensions of competitiveness are computed: resources and competencies, processes, outputs, and intangible assets (structural capital and human capital indices).
The Value Explorer <sup>TM</sup>	An accounting methodology proposed by KPMG for calculating and allocating value to five types of intangibles: assets and endowments, skills and tacit knowledge, collective values and norms, technology and explicit knowledge, and primary and management processes.
Intellectual asset valuation	Methodology for assessing the value of intellectual property.
Market-to-book value	The value of IC is considered to be the difference between the business's stock market value and its book value.
VAJCIM	An equation that measures how much and how efficiently IC and capital employed create value based on the relationship among three major components: capital employed, human capital, and structural capital.
Skandia Navigator <sup>TM</sup>	IC is measured through the analysis of up to 164 metric measures (91 intellectually based and 73 traditional) that cover five components: financial, customer, process, renewal and development, and human.

<sup>a</sup>. Source: Aitouche, Mouss, Mouss, Kaanit, and Marref (2015)

The advantages of VAIC<sup>TM</sup> according to [15] include the following: (1) it centers on the value added of the income

statement and not altering or conflicting with other fundamental accounting principles, (2) it allows companies to benchmark in accordance with the efficiency of the IC and being applied to all levels of the business and at the national level for developing strategies that can improve performance, (3) it is a technique that enhances cognitive understanding and enables ease of calculation by internal and external stakeholders, (4) it is objective and verifiable, (5) it is easy to use as ratios and data can be easily retrieved from accessible financial statements by the public, and (6) it is an appropriate tool for measuring potential and open intellectual performance of management interventions.

The VAIC<sup>TM</sup> model starts when the company is able to create value added (VA). Value added is the most objective indicator for assessing business success and demonstrating a company's value creation ability. Value added is calculated as the difference between output and input. Output (OUT) represents revenue and covers all products and services sold in the market, whereas input (IN) includes all expenses used to generate revenue. The important point in this model is that the labor expenses are not included in the input. A key aspect of the Pulic model is that it handles labor as a value-creating entity.

Ullum [9], developed the VAIC<sup>TM</sup> model by adding one variable to represent relational capital (RC). This model is called the Modified VAIC (MVAIC). Fig. 1 illustrates the MVAIC model.

#### D. Hypotheses Development

Theoretically, the relationship between intellectual capital and performance is a positive one, but this can be questioned from a practical side [8]. Three reasons for this questioning [8]. First, there is still a difference in the measurement of intellectual capital between literature and practice and its contribution to the performance of the company. Therefore, the use of different measurements can lead to incomparable results. The second reason is that the analysis is done in different contexts, particularly the differences in the places and times of the study. Third, because of the time that needs to pass before observing the effects of intellectual capital, performing a performance analysis several years after the investment in intellectual capital is important.

Differences in intellectual capital may occur in Southeast Asian countries because of differences in domestic factors, such as cultural or regulatory disclosures in financial statements, company developments, and macroeconomic factors.

Studies comparing the intellectual capital in Asean countries are limited [6]. For example, no research has been found on intellectual capital in the Philippines. Nimtrakoon [6] then conducted a study comparing the intellectual capital in five Asean countries, namely, Indonesia, the Philippines, Malaysia, Thailand, and Singapore. The result of the research is that intellectual capital as a whole does not differ among countries, but the intellectual capital components of HC, SC, RC, and CE differ among countries.

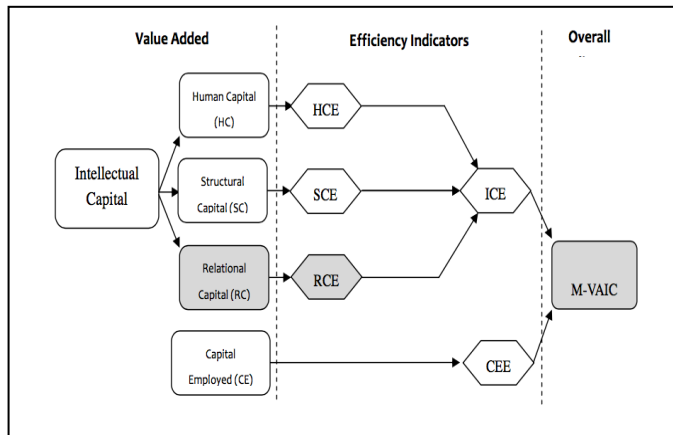


Fig. 1. Modified VAIC Model; source: Ulu et al. [9]

The research on intellectual capital and company performance has different results. In general, intellectual capital has a positive effect on company performance. Jordão, et al. [7], found that intellectual capital in companies in Brazil affects their long-term performance. Intellectual capital has a positive effect on profitability and corporate returns. Intellectual capital helps systematically improve a company's performance over time. The results of [2] indicate that intellectual capital as a whole is found to have a positive effect on company performance. The results of [3] found that intellectual capital in European countries has a positive effect on financial performance and market value. Nimtrakoon [6], also found that intellectual capital in Asian countries has a positive relationship with market value.

**H1a.** Intellectual capital has a positive effect on financial performance.

**H1b.** Intellectual capital has a positive effect on market performance.

Companies that can acquire and manage intellectual capital will improve their performance. The efficient use of resources will result in lower costs that will then increase the company's profits. If the company can utilize, manage, and develop skilled and competent human resources, it will indicate better performance and then generate profits and improve its performance. The effect of intellectual capital on firm performance, when tested for HC, SC, and CE, can have different results. Inconsistent research results are found in tests of component intellectual capital [2]. The results of [4] show that ROE is influenced by CE, ROA is affected by SC, and ATO is influenced by CE. The results of [3] showed that CE has a positive effect on a company's short-term performance and SC has a positive effect on the company's long-term performance. The results of the study by [8] showed that only CE affects a company's performance. The results of [5] showed that RC and PrC have a positive influence on company performance. HC moderates the relationship between InnC and firm performance.

The relationship between intellectual capital and market performance is as follows. In efficient markets, organizations with high levels of intellectual capital will exhibit higher market values. In other words, intellectual capital is an important resource in creating a competitive advantage that contributes to company performance (Riahi-Belkaoui 2003) in [6]. The results of [4] showed that market performance is

affected by HC. The results of [3] showed that HCE and SCE have a positive effect on market value. The results of [8] showed that only CE affects a company's performance. The results of [6] suggested that CEE, SCE, and HCE have a positive effect on market value.

**H2a.** Human capital has a positive effect on financial performance.

**H3a.** Human capital has a positive effect on market performance.

**H2b.** Structural capital has a positive effect on financial performance.

**H3b.** Structural capital has a positive effect on market performance.

**H2c.** Relational capital has a positive effect on financial performance.

**H3c.** Relational capital has a positive effect on market performance.

**H2d.** Capital employed has a positive effect on financial performance.

**H3d.** Capital employed has a positive effect on market performance.

### III. RESEARCH METHODOLOGY

#### A. Population and Sample

The population for this research is a company in the knowledge-based industry in Southeast Asia. The reason for choosing a knowledge-based industry is that intellectual capital is a significant need and is used in company operations, and such data can be found on intellectual capital. Southeast Asia was chosen because of the growing potential of the industry given that the population's consumption is still growing. Included in the knowledge-based industry are companies engaged in pharmaceuticals, telecommunications, computer and information technology services, automotives, electronics and cable, and chemical. Countries included in the Southeast Asian region which include Thailand, Vietnam, Philippines, Indonesia, Malaysia, and Singapore.

Data are obtained from the Thompson Reuters database. The 2015 data are required to calculate MVAIC and the 2016 data used are enterprise performance data. The sample selected from these criteria has complete data related to performance components and MVAIC.

The sample selection obtained provided as much as 242 observations with the following details (Table II).

#### B. Variables

The dependent variables used in this research are financial performance and market performance. Company performance is measured using ROA (return on assets) = net income/total assets. Market performance is measured using PBV (price to book value) = closing stock price/book value per share.



TABLE II. SAMPLE SELECTION

Country	Final Sample
Indonesia	42
Malaysia	51
Singapore	38
Thailand	74
Vietnam	27
Philippines	10
Total	242

The independent variable in this study is intellectual capital measured using Modified VAIC (MVAIC) from Ulum et al. (2014). MVAIC is calculated as follows:

$$\begin{aligned}
 VA &= \text{OUT-IN} \\
 CEE &= VA/CE \\
 HCE &= VA/HC \\
 SCE &= SC/VA \\
 RCE &= RC/VA \\
 ICE &= HCE + SCE + RCE \\
 MVAIC &= ICE + CEE
 \end{aligned}$$

VA is a value-added company, OUT is total revenue, IN is total cost minus employee cost, CEE is capital employed efficiency, and CE is measured using total assets minus intangible assets. HCE is human capital efficiency, HC is measured using total employee cost, SCE is structure capital efficiency, SC is measured using VA-HC, RCE is relational capital efficiency, RC is measured using marketing cost, ICE is intellectual capital efficiency, and MVAIC is the modified value-added intellectual coefficient.

The control variables in this study used are firm size and leverage. Company size is measured using Ln Total Assets and leverage is measured using the ratio of total debt to total assets.

### C. Hypotheses Testing

The first hypotheses testing used multiple regression, with financial performance (ROA) and market performance (PBV) as dependent variables; MVAIC as the independent variable; and firm size (Size) and Leverage (Lev) as control variables. The regression equation is as follows:

$$POA_{\tau} = \alpha_0 + \alpha_1 M\zeta AIX_{\tau-1} + \alpha_2 \Sigma \zeta \varepsilon_{\tau} + \alpha_3 \Lambda \varepsilon \varpi_{\tau} + \varepsilon \quad (1)$$

$$PIB_{\zeta \tau} = \alpha_0 + \alpha_1 M\zeta AIX_{\tau-1} + \alpha_2 \Sigma \zeta \varepsilon_{\tau} + \alpha_3 \Lambda \varepsilon \varpi_{\tau} + \varepsilon \quad (2)$$

The second hypothesis test used multiple regression, with financial performance (ROA) as the dependent variable; HCE, SCE, RCE, and CEE as independent variables; and firm size (Size) and Leverage (Lev) as control variables. The regression equation is as follows:

$$POA_{\tau} = \alpha_0 + \alpha_1 HXE_{\tau-1} + \alpha_2 \Sigma XE_{\tau-1} + \alpha_3 PXE_{\tau-1} + \alpha_4 XEE_{\tau-1} + \alpha_5 \Sigma \zeta \varepsilon_{\tau} + \alpha_6 \Lambda \varepsilon \varpi_{\tau} + \varepsilon \quad (3)$$

The third hypothesis test uses multiple regression, with market performance (PBV) as the dependent variable; HCE, SCE, RCE, and CEE as independent variables; and firm size (Size) and Leverage (Lev) as control variables. The regression equation is as follows:

$$PIB_{\zeta \tau} = \alpha_0 + \alpha_1 HXE_{\tau-1} + \alpha_2 \Sigma XE_{\tau-1} + \alpha_3 PXE_{\tau-1} + \alpha_4 XEE_{\tau-1} + \alpha_5 \Sigma \zeta \varepsilon_{\tau} + \alpha_6 \Lambda \varepsilon \varpi_{\tau} + \varepsilon \quad (4)$$

## IV. RESULTS

### A. Descriptive Statistics

Descriptive statistics of the research variables can be seen in Table III. With 242 observations, the PBV variable shows a maximum of 10.93 and a minimum of -7.42, with an average of 1.829. For the average ROA variable of 4.31, the maximum is 33.44 and the minimum is -66.12. For the first control variable, Log Total assets, the average is 7.047, with a maximum of 11.41 and a minimum of 4.239. The second control variable is leverage, with an average of 24.367, a minimum of 0 and a maximum of 474.02. For the MVAIC variable, the average value is -0.258, with a minimum of -21.037 and a maximum of 22.181. The first MVAIC-forming variable is the HCE variable, with an average of -0.757 with a minimum of -20.322 and a maximum of 15.567. The average SCE variable is 1.8619 with a minimum of -11.01636 and a maximum of 18.9069. The average RCE variable is -1.267 with a minimum of -11.01636 and a maximum of 18.9069. The CEE variable shows an average of -0.0958 with a minimum of -1.799 and a maximum of 0.3516 (see Table III).

The average comparison of MVAIC values and the components (HCE, SCE, RCE, and CEE) among countries is indicated in Table 4. The highest average MVAIC value is for the Philippines at 1.7662, and the lowest value is for Indonesia at -1.8779. The highest average HCE is for Indonesian at 1.4041, and the lowest is for Malaysia at -2.050. The highest average SCE score is for Malaysia at 3.9131, and the lowest is for Indonesia at -0.4434. The average value of RCE for Singapore is 2.2116, and the lowest is for Indonesian at -2.5385. The highest CEE average value of Singapore is 1.0924, and the lowest is Indonesia at -0.0576 (Table IV).

The correlation between variables can be seen in Table V. Almost all variables are correlated except for the SCE and RCE variables.

The RCE, SCE, and RCE variable disclosure items of the company are indicated in Table VI. The disclosure item corresponds to the attributes used by [16].

TABLE III. DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
PBV	242	1.829174	1.919568	-7.42	10.93
ROA	242	4.311074	11.70918	-66.12	33.44
logTA	242	7.046796	1.775678	4.239049	11.41141
Leverage	242	24.36731	40.68153	0	474.02
CEE	242	-0.095800	0.2167854	-1.799907	0.3516477
HCE	242	-0.757468	3.573838	-20.32285	15.56742
SCE	242	1.861967	3.225928	-11.01636	18.9069
RCE	242	-1.267127	3.786829	-27.51542	9.129937
MVAIC	242	-0.258429	4.554044	-21.03733	22.181

TABLE IV. COMPARISON OF MVAIC AMONG COUNTRIES

Country	MVAIC	HCE	SCE	RCE	CEE
Indonesia	-1.8779723	1.40416814	-0.4434577	-2.5385243	-0.0576324
Malaysia	-0.6167721	-2.0502226	3.91313719	2.21163679	0.32784492
Singapore	1.3802974	0.08465418	1.09014279	2.31882217	1.09248327
Thailand	0.07733636	-0.495026	2.07624497	-2.0395788	-0.0576324
Vietnam	-1.2351125	-0.605048	1.45620519	-2.0395788	-0.0466909
Philippines	1.76623067	0.72843784	0.75628161	0.25901726	0.02249396

TABLE V. CORRELATION BETWEEN VARIABLES

	PBV	ROA	logTA	Leverage	CEE	HCE	SCE	RCE	MVAIC
PBV	1								
ROA	0.3901*	1							
	0								
ROA	0.3901*	1.0000*							
	0	0							
logTA	0.0929*	0.2464*	1						
	0.1497	0.0001							
Leverage	-0.1241*	-0.1414*	0.1485*	1					
	0.0538	0.0279	0.0208						
CEE	0.1282*	0.5701*	0.2460*	-0.2906*	1				
	0.0463	0	0.0001	0					
HCE	0.1968*	0.3789*	0.1368*	-0.1730*	0.4492*	1			
	0.0021	0	0.0334	0.007	0				
SCE	-0.0555*	0.0027	-0.00034416	0.0072	-0.0401	-0.0302	1		
	0.39	0.9663	0.4587	0.9118	0.5345	0.6398			
RCE	0.0443*	-0.0016	-0.0346	-0.0022	0.0208	0.1009*	-0.7996*	1	
	0.4932	0.9801	0.6157	0.9725	0.7473	0.1175	0		
MVAIC	0.1580*	0.3250*	0.0582*	-0.1463*	0.3890*	0.8686*	0.0179	0.3453*	1
	0.0139	0	0.3674	0.0228	0	0	0.782	0	

Table In almost all disclosure items, the highest disclosure value is for Thailand, such as on patent items of 14 companies, copyrights of eight companies, and trademarks of 20 companies. Regarding item management philosophy, Singapore has the highest number of most revealing companies, at seven. Corporate culture disclosure items are mostly done by Thailand, with as many as 23 companies. Item management processes are mostly done by Malaysia, with as many as 37 companies, and information system items are most widely disclosed in Thailand, with as many as 24 companies. Vietnam has the highest disclosure of networking systems, with four companies. No companies disclose financial disclosure items. The RCE disclosure items, dominated by corporate disclosures in Thailand such as for brands, customers, customer loyalty, company names, and channel distribution, are mostly revealed by companies in Thailand. Total disclosures were by 19 companies for brand items, 54 companies for customer items, 13 companies for customer

loyalty items, 42 companies for company names, and 14 companies for distribution channel items.

Business collaboration disclosure items are mostly revealed by as many as two companies in Vietnam. For favorable contract items, Indonesia and Singapore each had as many as four companies that disclosed franchising agents. HCE component disclosure items, such as know-how, educational, vocational qualification, and work-related knowledge are most disclosed by Thailand. Know-how was disclosed by as many as 36 companies, educational items were disclosed by as many as 50 companies, vocational qualification items were revealed by as many as 15 companies, and work-related knowledge items were revealed by as many as ten companies. The highest number of work-related competence disclosure items were disclosed by Malaysia, by as many as 41 companies. Entrepreneurial spirit disclosure items were most disclosed by Singapore, by as many as 17 companies.

TABLE VI. 6: INTELLECTUAL DISCLOSURES BETWEEN COUNTRY

Disclosure items	Frequency					
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Internal (Structural) Capital						
Intellectual Property						
Patent	4	3	3	6	14	3
Copyrights	2	1	0	0	8	4
Trademark	7	2	3	4	20	7
Infrastructure Assets						
Management Philosophy	0	1	2	7	0	0
Corporate Culture	10	6	0	2	23	2
Management Processes	13	37	2	17	14	3
Information System	7	11	2	1	24	1
Networking System	0	0	0	0	3	4
Financial relation	0	0	0	0	0	0
External (Customer/Relational) Assets						
Brands	18	7	5	14	19	6
Customer	33	53	8	35	54	12
Customer Loyalty	5	10	2	4	13	1
Company names	19	7	2	3	42	7
Distribution channel	7	1	1	2	14	5
Business Collaboration	0	1	0	0	1	2
Licensing agreement	4	3	1	0	0	0
Favorable contract	0	0	0	0	0	0
Franchising agreement	4	1	3	4	3	0
Employee Competence (Human Capital)						
Know how	9	19	3	10	36	1
Education	17	36	6	15	50	9
Vocational Qualification	4	3	1	3	15	2
Work related knowledge	2	1	0	1	10	0
Work related competencies	13	41	0	11	25	0
Entrepreneurial spirit	2	2	1	17	2	1

### B. Findings

The results of the Hypothesis 1 test is shown in Table 7. Hypothesis 1a, which states that intellectual capital has a positive effect on financial performance, cannot be rejected. This result is shown through the MVAIC coefficients of significance lower than an alpha of 1%. The coefficient of 0.747 with a positive direction can be interpreted as intellectual capital having a positive effect on financial performance. Hypothesis 1b, which states that intellectual capital has a positive effect on market performance, also cannot be rejected.

TABLE VII. RESULT OF HYPOTHESIS 1 TESTING

Variables	(1) ROA	(2) PBV
MVAIC	0.747*** (0.184)	0.0567** (0.0233)
logTA	1.646*** (0.443)	0.111 (0.0710)
Leverage	-0.0391** (0.0184)	-0.00565*** (0.00170)
Constant	-6.143* (3.546)	1.198** (0.523)
Observations	242	242
R-squared	0.175	0.046

TABLE VIII. HYPOTHESES TESTING RESULT

VARIABLES	(1) ROA	(2) PBV
CEE	25.88*** (7.805)	-0.00318 (1.022)
HCE	0.493* (0.296)	0.0898** (0.0375)
SCE	0.132 (0.137)	-0.0361 (0.0422)
RCE	0.0178 (0.123)	-0.00947 (0.0416)
logTA	0.717** (0.325)	0.0892 (0.0739)
Leverage	0.00217 (0.0187)	-0.00506** (0.00245)
Constant	1.839 (2.489)	1.447** (0.562)
Observations	242	242
R-squared	0.356	0.056

Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

This result is evidenced by a significance lower than an alpha of 5%. A coefficient of 0.0567 with a positive direction can be interpreted as intellectual capital having a positive effect on market performance. The total asset log control variable has a positive effect on ROA (financial performance) but does not affect PBV (market

performance). The leverage control variable negatively affects ROA (financial performance) and PBV (market performance).

The results of the Hypotheses 2 and 3 testing are provided in Table 8.

Hypothesis 2a, which states that human capital has a positive effect on financial performance, cannot be rejected. This result is shown by a significance lower than an alpha of 10% and a coefficient of 0.493 with a positive direction, as stated in the hypothesis. Hypothesis 2b, which states that structural capital has a positive effect on financial performance, is rejected. This result is showed by the significance higher than an alpha of 5%, which indicates that structural capital does not affect the financial performance of a company. Hypothesis 2c, which states that relational capital has a positive effect on financial performance, is rejected. This result is shown by a significance value higher than a 5% alpha, which means that relational capital does not affect a company's financial performance. Hypothesis 2d, which states that capital employed a positive effect on financial performance, cannot be rejected. This result is shown by a significance lower than an alpha of 1% with a coefficient of 25.88 with a positive direction, as stated in the hypothesis. The total asset log control variable has a positive effect on ROA (financial performance)—proven at a smaller significance of 5% alpha and a coefficient of 0.717 with a positive direction. The leverage control variable has no effect on the company's financial performance, as evidenced by a significance higher than an alpha of 5%.

Hypothesis 3a, which states that human capital has a positive effect on market performance, cannot be rejected. This result is evidenced by a significance lower than an alpha of 5% and a coefficient of 0.0898 with positive direction, according to the hypothesis. Hypothesis 3b, which states that structural capital has a positive effect on market performance, is rejected. This result can be evidenced by a significance higher than an alpha of 5%, which indicates that structural capital does not affect market performance. Hypothesis 3c, which states that relational capital positively affects the performance of the market, is rejected. This result can be proven with significance higher than an alpha of 5%, which indicates that relational capital has no effect on market performance. Hypothesis 3d, which states that the capital employed positively affects market performance, is rejected. This result can be proven with a significance higher than an alpha of 5%, which indicates that the capital employed has no effect on market performance. The total asset log control variable has no effect on the PBV (market performance), which is observed through a significance higher than an alpha of 5%. Leverage control variables negatively affect PBV (market performance), which can be observed with a significance lower than an alpha of 5% and a coefficient of  $-0.00506$  with a negative direction.

## V. DISCUSSION

### A. *Effect of Intellectual Capital on Firm Performance*

In this research, the result of the Hypothesis 1a testing is that intellectual capital has a positive effect on a firm's financial performance, in accordance with the hypothesis proposed. Therefore, for companies in knowledge-based industries in Southeast Asian countries, more intellectual capital results in better financial performance. The results of this study prove that the intellectual capital owned and managed well by a company positively influences the company and improves its financial performance. In knowledge-based industries, companies rely on the intellectual capital that they own to operate their business. By using intellectual capital to the maximum, a company can grow and provide maximum financial performance. The relationship of intellectual capital with firm performance is significant, indicating that intellectual capital is related to a company's financial performance. From a comparison calculation of the intellectual capital between countries, the highest is the Philippines. The results of this study support [2, 3, 6, 7].

The result of the Hypothesis 1b test is that intellectual capital has a positive effect on market performance. The hypothesis cannot be rejected, which indicates that more intellectual capital in knowledge-based industries in Southeast Asian countries improves a company's market performance. This result proves that the intellectual capital owned and managed by knowledge-based companies in Asian countries can improve a company's market performance. The intellectual capital relationship with market performance is significant, indicating that intellectual capital is related to market performance. This study supports [6].

### B. *Effect of Human Capital on Financial Structural Capital, Relational Capital, and Capital Employed on Financial Performance*

The result of the Hypothesis 2a test is that human capital has a positive effect on a company's financial performance. This result can be explained as follows: the higher the human capital owned by the company, the larger the increase in the company's financial performance. In knowledge-based industries, human capital plays an important role in the success of the company because the industry is based on the skills and knowledge possessed by employees. Human capital is owned by company employees who can be measured through the creativity and innovation that they exhibit. Knowledge and education are also indispensable in running a company's business. If the company can effectively manage its employees' abilities, then its business runs well, its profitability increases, and its performance ultimately improves. The results of this study support [2, 3].

The result of the Hypothesis 2b test states that structural capital does not affect a company's financial performance. In knowledge-based industries in Southeast Asian countries, structural capital does not affect a company's financial performance. Structural capital in the



form of physical infrastructure, patents, trade secrets, and copyrights, may not have a direct role in the creativity and innovation that can improve a company's financial performance. Structural capital may support the human capital that does not directly affect the company's financial performance. The results of this study support [10, 17].

The results of the Hypothesis 2c test states that relational capital does not affect a company's financial performance. In a knowledge-based industry in Southeast Asian countries, relational capital does not affect the financial performance of the company. This relational capital consists of good relationships with customers and suppliers, as well as customer and supplier allegiances. In this knowledge-based relational capital company, its financial performance may not be affected. The results of this study support [18].

The result of the Hypothesis 2d test shows that capital employed has a positive effect on a company's financial performance. Therefore, with a higher capital employed, the company's financial performance also increases. The results of this study support [6].

### 5.3 Effect of Human Capital, Structural Capital, Relational Capital, and Capital Employed on Market Performance

The result of the Hypothesis 3a test is that human capital has a positive effect on a company's market performance. This result can be explained as the higher human capital owned by the company increasing the company's performance in the market. High human capital leads to high market performance, indicating that high human capital may be a signal that technology-based companies in Southeast Asian countries use and manage human capital when conducting their business, a view that is trusted by the market and reflected in the increasing market performance. The results of this study support the findings in [4].

The result of the Hypothesis 3b test indicates that structural capital does not affect the company's market performance. Structural capital, which includes patents, trade secrets, copyrights, and trademarks, may not directly affect a company's market performance. In knowledge-based industries, patents and trade secrets are the results of innovation, making them the result of the human capital use process and, thus, not affecting market performance.

The results of the Hypothesis 2c test indicate that relational capital does not affect a company's market performance. Thus, in knowledge-based companies in Southeast Asian countries, relational capital, such as relationships with customers and suppliers, does not affect the market performance of the company.

The results of the Hypothesis 2d test indicates that capital employed does not affect a company's market performance. Thus, in knowledge-based companies in Southeast Asian countries, capital employed does not affect a company's market performance.

## VI. CONCLUSION

This study examines the influence of intellectual capital on the financial and market performance of a company. The

research was conducted in companies that belong to knowledge-based industries in Southeast Asian countries. Intellectual capital is measured using intellectual capital (MVAIC). The result of the research shows that MVAIC has a positive effect on financial and market performance and that the components of MVAIC have different effects: HCE has a positive effect on financial performance and market performance, SCE has no effect on financial performance and market performance, RCE has no effect on financial performance and market performance, and CEE has a positive effect on financial performance and no effect on market performance.

The limitation of this study is the time lag used of only one year because intellectual capital investments can be reflected in the long term. Therefore, using a one-year time lag makes a description of the effect of investment in intellectual capital less feasible. Future research can extend the time lag to reflect the effects of investments in intellectual capital.

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