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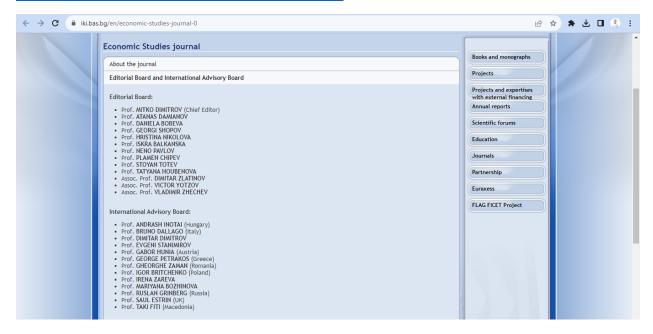
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Impact of Intellectual Capital on Financial Performance: Panel Evidence from Banking Industry in Indonesia

Impact of Intellectual Capital on Financial Performance: Panel Evidence from Banking Industry in Indonesia

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Keywords: IC; Banking Industry; Financial Performance; Resource Based Theory; Value Added Intellectual Coefficient

Summary/Abstract: This research investigates the impact of intellectual capital (IC) on the financial performance of Indonesian bank enterprises. Data were collected from 42 Indonesian banks between 2017 and 2021. IC was measured using descriptive statistics, correlation coefficients, and panel data regression techniques, as well as the Value Added Intellectual Coefficient (VAIC) component through Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE), and Structural Capital Efficiency (SCE), and their impact on financial performance through Return on Assets (ROA), Return on equity (ROE), and Asset Turnover (ATO). The analysis was conducted with secondary data extracted from the firms' annual reports. The results show the impact of the VAIC model and the VAIC component on financial performance. The VAIC model significantly affects financial performance, namely ROA, ROE, and ATO. The VAIC component does not significantly affect financial performance results, although SCE significantly affects financial performance as measured by ATO. This research expands the knowledge and evaluates financial performance and the creation of corporate bank value. It can be used across industries, and the findings have implications for the banking industry in the context of competitive advantage and for company managers. This study presents empirical evidence and broadens our understanding of the use of IC to enhance the financial performance of Indonesian banking firms.

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IMPACT OF INTELLECTUAL CAPITAL ON FINANCIAL PERFORMANCE: PANEL EVIDENCE FROM BANKING INDUSTRY IN INDONESIA[3]

This research investigates the impact of intellectual capital (IC) on the financial performance of Indonesian bank enterprises. Data were collected from 42 Indonesian banks between 2017 and 2021. IC was measured using descriptive statistics, correlation coefficients, and panel data regression techniques, as well as the Value Added Intellectual Coefficient (VAIC) component through Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE), and Structural Capital Efficiency (SCE), and their impact on financial performance through Return on Assets (ROA), Return on equity (ROE), and Asset Turnover (ATO). The analysis was conducted with secondary data extracted from the firms' annual reports. The results show the impact of the VAIC model and the VAIC component on financial performance. The VAIC model significantly affects financial performance, namely ROA, ROE, and ATO. The VAIC component does not significantly affect financial performance results, although SCE significantly affects financial performance as measured by ATO. This research expands the knowledge and evaluates financial performance and the creation of corporate bank value. It can be used across industries, and the findings have implications for the banking industry in the context of competitive advantage and for company managers. This study presents empirical evidence and broadens our understanding of the use of IC to enhance the financial performance of Indonesian banking firms.
Keywords: IC; Banking Industry; Financial Performance; Resource Based Theory; Value Added Intellectual Coefficient
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1. Introduction

The global economy is developing fast, leading to more intense competition between businesses. Increasing competition among business actors means companies must be able to change how they improve and endeavour to optimize the resources to maintain their position.

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Businesses in many industries consider value creation essential in their ability to create a competitive advantage (Poh et al., 2018a). In this case, various factors will be pursued to improve the performance of a company that is carried out continuously. This is because competition between companies is getting high and unavoidable. Therefore, adequate intellectual capital (IC) management has been recognized as the most crucial source of value creation and organizational competitive advantage (Nawaz, Haniffa, 2017).

IC was developed by Pulic (2000). The company's ability to incorporate the IC concept is a significant advancement as it heralds a new era in which personnel, expertise, and intellectual assets are prioritized. The Value Added Intellectual Coefficient (VAIC) model, which measures the amount of additional value created per unit of expenditure on each resource, is the foundation for measuring IC (Pulic, 2004).

The primary function of the VAIC model is to demonstrate, at both the microeconomic and macroeconomic levels, the stimulation of economic growth attributable to the added value provided by IC (Polcyn, 2022). In other words, the VAIC model helps to present the success of a company's IC by recognizing the latter's importance to the company's performance and competitiveness while highlighting the need to manage it effectively (Bayraktaroglu *et al.*, 2019). This is critical in terms of strategy execution for the company to gain a competitive advantage and improve its performance. However, it has been shown that higher-performing companies can also attract increased IC, including better human resources (Lu et al., 2021; Soewarno, Tjahjadi, 2020).

Business value is created through physical assets and, ideally, the successful management of IC (Poh et al., 2018b). However, this is also the main reason business value should be used carefully when assessing whether IC is being used efficiently in a company (Dzenopoljac et al., 2017). The approach raises challenges for accountants in identifying, measuring, and disclosing such value in financial statements. Therefore, to expand their businesses, enterprises should pursue more outstanding efforts to develop IC (Ni *et al.*, 2020). Investment in IC has become mandatory in this modern era of globalization due to its long-term return on investment (Ahmed et al., 2019). A company's success in the face of competition highly depends on the knowledge management strategy rather than the strategy of allocating physical and financial assets.

The majority of prior research in this area has employed the VAIC model to determine the relationship between IC (Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE), and Structural Capital Efficiency (SCE)) and financial performance (Return On Assets (ROA), Return On Equity (ROE), and Asset Turnover (ATO)) (Bhattu-Babajee and Seetanah (2022); Chowdhury *et al.* (2018); García Castro *et al.* (2021); Nawaz and Haniffa (2017); Soewarno and Tjahjadi (2020); Tran & Vo (2018); Weqar *et al.* (2021); Xu and Liu (2020); Xu and Zhang (2021)). However, there is some inconsistency evident between the different studies, as seen in Table 1.

This study continues the previous research, notably that of Soewarno and Tjahjadi (2020), by examining the relationship between IC and financial performance in banking studies in Indonesia. Soewarno and Tjahjadi (2020), used the 2012-2017 period; however, this study uses the 2017-2021 period. The VAIC model was adapted from the model developed by Pulic (2004), while the analysis uses the financial performance indicators ROA, ROE, and asset

turnover (ATO) in statistical models. On the other hand, this study focuses on several reasons. First, it uses panel data analysis, which has yet to be used in the estimation analyses of previous studies. Second, the results obtained from previous studies needed to be more consistent. Finally, this study contributes empirical evidence to the theory and literature of IC on banking case studies, especially in developing countries, including Indonesia.

Additionally, the banking sector has begun to implement and focus on IC. This demonstrates that the assessment of sound financial performance in the banking sector based on the content of financial statements does not indicate banks' effective and efficient management of IC (Poh *et al*., 2018). According to Tran and Vo (2018), IC measurement in the financial system is highly accurate. First, banking operations rely heavily on consumers to generate a competitive advantage. Second, bank products are not manufactured objects but services with a monetary value based on IC. Finally, banks must invest in human resources, brand names, systems, and processes to deliver the best possible service to their customers.

The reasons for the importance of this research include the increasing awareness of the banking sector in Indonesia in managing IC and the important role that IC plays in gaining a competitive advantage. Companies must be competitive and superior relative to their rivals to survive in today's business environment. The future success and profitability of a business depends largely on its ability to harness the power of its intellectual capital. A company can gain a competitive advantage, for example. If a company has an advantage over its rivals, it shows that it has something that these companies do not have. Competitive advantage describes this situation. Companies today go beyond their material possessions and financial resources to their distinctive intellectual capital to forge a sustainable competitive advantage. This suggests that a company's ability to maximize its intangible assets is a key factor in determining its competitive advantage.

Therefore, financial institutions need to manage their IC in the most effective manner possible. It has been demonstrated that IC plays a crucial role in the achievement of financial success as well as a competitive advantage in the banking industry (Soewarno & Tjahjadi, 2020). The remainder of this paper is structured as follows. Section 2 introduces the theory relevant to IC, the VAIC as a tool for measuring IC and its extended version in the relevant literature, and the hypothesis development. In section 3, we describe the many variables as well as the research approach that was utilized. The findings from the analysis are discussed in section 4. This is followed in the final section by the conclusion and limitations of this study and the implications for the future.

2. Literature Review

The Resource Based Theory (RBT) of companies is based on the relationship observed between tangible and intangible resources and financial performance (Smriti, Das, 2018; Soewarno, Tjahjadi, 2020). RBT is based on the added value of every resource owned and controlled by a business organization (Anifowose et al., 2018). Resource Based Theory is characterized by the superiority of knowledge or an economy that relies on intangible assets. This theory relies on the superiority of the resources owned by the company so that it can compete with its competitors, the difference between the resources owned by the company

will provide a competitive advantage for the company. Theoretically, the concept of IC mainly depends on the RBT of enterprise and its variations – the idea of dynamic and core capabilities (Komnenic, Pokrajčić, 2012).

The business finally realized that its intangible assets, such as its capacity for innovation, information systems, organizational management, and human resources, were just as important to its survival as its physical assets in order to remain competitive in its field. According to Zéghal and Maaloul (2010), businesses acquire a competitive edge and achieve superior financial results by retaining and effectively utilizing strategic resources. This demonstrates that if a company wishes to gain a competitive advantage, it must be able to obtain, identify, and organize its resources effectively and efficiently. Company resources are the main drivers of competitiveness and company performance. A company, therefore, gains a competitive advantage and superior performance by combining and employing its assets.

Table 1. Previous Study

Scholar(s)	Model VAIC	Financial Performance		
		ROA	ROE	ATO
1. Soewarno & Tjahjadi	HCE	NS	NS	S
	CEE	S	S	NS
	SCE	S	S	S
2. Ozkan et al.	VAIC	NS	-	-
	HCE	S	-	-
	CEE	S	-	-
	SCE	NS	-	-
3. Tran & Vo	VAIC	S	-	-
	HCE	S	-	-
	CEE	NS	-	-
	SCE	NS	-	-
4. Xu & Liu	HCE	S	S	S
	CEE	S	S	S
	SCE	NS	S	NS
5. Nawaz & Haniffa	VAIC	S	-	-
	HCE	S	-	-
	CEE	NS	-	-
	SCE	S	-	-
6. Poh et al.	VAIC	S	S	-
	HCE	NS	S	-
	CEE	S	NS	-
	SCE	NS	S	
7. Nadeem et al.	HCE	S	S	S
	CEE	S	S	S
	SCE	S	S	S
8. Bayraktaroglu et al.	HCE	S	NS	NS
	CEE	S	S	NS
	SCE	NS	NS	S
9. Olarewaju & Msomi	VACA	S	-	-
	VAHC	S	-	-
	SCVA	S	-	-
10. Weqar et al.	VAIC	S	NS	NS
	HCE	S	NS	NS
	CEE	NS	NS	NS

Scholar(s)	Model VAIC	Financial Performance		
		ROA	ROE	ATO
	SCE	NS	NS	NS
11. Chowdhury et al. (Textile Sector)	HCE	S	NS	NS
	CEE	NS	NS	NS
	SCE	NS	NS	S
12. Bhattu-Babajee & Seetanah	HCE	S	-	-
	CEE	NS	-	-
	SCE	S	-	-
13. Xu & Zhang	HCE	S	S	-
	CEE	S	NS	-
	SCE	NS	NS	-
14. Lu et al.	VAIC	S	-	-
	HCE	S	-	-
	CEE	S	-	-
	SCE	S	-	-
15. Ousama et al.	VAIC	S	S	-
	HCE	S	S	-
	CEE	S	S	-
	SCE	NS	NS	-
16. Kasoga	VAIC	S	-	S
	HCE	NS	-	NS
	CEE	NS	-	NS
	SCE	S	-	S
17. Chowdhury et al. (Pharmaceutical Industry)	HCE	S	NS	NS
	CEE	NS	NS	S
	SCE	NS	NS	NS

Note: NS: Not Supporte, S: Supported
Source: Authors' Calculations.

IC is a driver of intangible value and is increasingly essential for high business performance. The IC-based theory considers it the only strategic resource that enables firms to create added value (Joshi et al., 2013). Resources must have specific characteristics, such as being unique, non-imitable, non-substitutable, and observable; employees' skills and experience acquired over time and organizational processes (Smriti, Das, 2018). For this reason, IC and knowledge management have emerged as core competencies for corporate growth and protecting competitive advantage (Joshi et al., 2013). The existence of a good utilization role of Intellectual Capital will affect the ability to create innovation and creativity for the company to exist in industrial competition.

According to Nassar (2018), VAIC is a measure of IC used to investigate the relationship between IC, company financial performance, and market value. Bayraktaroglu et al. (2019) identified the three components of VAIC includes, namely Human Capital Efficiency (HCE), Capital Employed Efficiency (CEE), and Structural Capital Efficiency (SCE), that measure how value is created using the physical assets and IC available within the company. The VAIC value of a company is the total HCE, SCE, and CEE**.**

Employees are considered an asset of the company; therefore, human capital is a crucial component of the company's value creation (Smriti, Das, 2018). As a first step, HCE, the ratio of a company's value added to its expenditure on human capital, is used to determine the value contributed by human capital (Chowdhury et al., 2018). In contrast, SCE

encompasses company culture, information management, and database design (Dzenopoljac et al., 2017). Structural capital concerns the company's primary supportive structure that enables employees to achieve performance and managers to maintain profitable relationships with key external stakeholders (William et al., 2019). CEE measures the value created per unit of shareholder capital currency, which is interpreted as financial capital (Nadeem et al., 2019). Therefore, to expand their business, enterprises should make more outstanding efforts to develop IC (Ni et al., 2020).

According to RBT, company resources are the main drivers of competitiveness and performance. A company's performance is considered to equal its organizational efficiency, which in turn represents the extent to which the organization, as a social system with limited resources and means, achieves its goals without excessive effort on the part of its members (Taouab, Issor, 2019). In studies evaluating the relationship between IC efficiency and with the financial performance of financial institutions, VAIC and its components (CEE, HCE, and SCE) have been used as measures of IC efficiency. ROA, ROE, and ATO are employed as indicators of financial performance. However, numerous studies have reported contradictory findings. This has sparked a discussion regarding the magnitude of the effect of IC on a firm's bottom-line results.

Previous research has demonstrated the relationship between the VAIC model and financial performance. In a case study in the Indian finance sector, Weqar et al. (2021) showed that VAIC positively affected ROA at the 10% level of significance but had no significant impact on ROE and ATO. Nawaz and Haniffa (2017) reported that the VAIC model positively and significantly affected ROA in Islamic financial institutions. Meanwhile, Tran and Vo (2018), in a study on the Thai banking sector, found that the results of the VAIC model were not significant to ROA. According to Smriti and Das (2018), the IC significantly impacted ROA, ATO, Tobin's Q, and sales growth from Indian firms listed in COSPI. We assume that the VAIC model positively correlates with financial performance (ROA, ROE, and ATO). Therefore, we propose:

> H1: The VAIC model has a positive relationship with ROA
>
> H2: The VAIC model has a positive relationship with ROE
>
> H3: The VAIC model has a positive relationship with ATO

The relationship between the VAIC component model and ROA. García Castro et al. (2021) found that HCE had a positive effect on ROA, and CEE and SCE had a negative effect on ROA at Colombian listed banking entities. Xu and Zhang (2021) studied Chinese agricultural listed companies and found, that while HCE and CEE had a positive and significant effect on ROA, SCE had no significant on ROA. Bhattu-Babajee and Seetanah (2022), in a study on Mauritian companies, showed that HCE, SCE, and CEE were positively related to ROA. We assume that the VAIC component model (HCE, CEE, and SCE) has a positive relationship to return on assets (ROA). Therefore, we propose:

> H1a: HCE has a positive relationship with ROA
>
> H1b: CEE has a positive relationship with ROA
>
> H1c: SCE has a positive relationship with ROA

The relationship between the VAIC component model to ROE. In a study on the Turkish manufacturing sector, Bayraktaroglu et al. (2019) found that HCE had a significant and positive impact on ROE, but CEE and SCE were not significant. Xu and Liu (2020) studied the manufacturing industry in South Korea, as the backbone of the nation's economy, and found that HCE, SCE and CEE had a significant and positive impact on ROE. In contrast, Chowdhury et al. (2019) investigated the pharmaceutical industry in Bangladesh, that HCE, CEE, and SCE did not affect ROE. We assume that the VAIC component model (HCE, CEE and SCE) has a positive relationship with ROE. Therefore, we propose:

H2a: HCE has a positive relationship with ROE

H2b: CEE has a positive relationship with ROE

H2c: SCE has a positive relationship with ROE

Finally, the relationship between the VAIC component model and ATO. The results of a study by Chowdhury et al. (2018) in the Bangladeshi textile sector, showed that CEE had a positive and significant effect on ATO, but SCE and HCE are not significant on ATO. Soewarno and Tjahjadi (2020), in a study on banking firms in Indonesia, reported that HCE and CEE had a positive and significant effect on ATO, but SCE was not significant on ATO. We assume that the VAIC component model (HCE, CEE, and SCE) has a positive relationship with ATO. Therefore, we propose:

H3a: HCE has a positive relationship with ATO

H3b: CEE has a positive relationship with ATO

H3c: SCE has a positive relationship with ATO

3. Methodology

3.1. Data Collection

This research uses quantitative data, which aligns with the approach taken by many in previous studies. In this case, the researcher points to the phenomenon of reality related to IC on financial performance in banking studies listed on the Indonesia Stock Exchange (IDX). The samples studied, which were selected through purposive sampling, comprise 42 out of the total population of 47 registered banks. The remaining five banks were not chosen because they did not publish financial statements for 2017-2021.

3.2. Variable

The independent variable in this study is IC. IC was determined based on the VAIC model, which measures the amount of new value created per monetary unit invested in each resource (Pulic, 2004). The first stage in computing the VAIC is to measure Value Added (VA). According to Pulic, VA is an objective measure of how well a business is performing and indicates its efficiency in creating value. As such, it must include investments in resources

such as salaries and interest on financial assets, dividends to investors, taxes paid to the state, and investments in the future. VA is thus formulated as follows:

$$VA = OP + EC + D + A$$

where: OP = operating profit; EC = employee costs; D = depreciation; A = amortization.

The second stage HCE, whereby the efficient use of human capital is estimated in terms of value creation by calculating the HCE ratio (Chowdhury et al., 2018). Based on Pulic's model, HCE is formulated as follows:

$$HCE = VA/HC$$

where: HCE = human capital efficiency coefficient for the company; VA = value added; HC = total salaries and wages for the company.

The third stage measure CEE this involves testing the amount of value created per unit of shareholder capital currency, which is interpreted as financial capital (Nadeem et al., 2019). Pulic formulated CEE as follows:

$$CEE = VA/CE$$

where: CEE = capital employed efficiency coefficient; VA = value added; CE = book value of the company's net assets.

The fourth stage of measuring VAIC consider SCE. SCE covers things areas such as corporate culture, information management, and databases (Dzenopoljac et al., 2017). The measurement of SCE comprises two components, which are formulated as follows:

$$SC = VA - HC$$

where: SC = structural capital for the company; VA = value added; HC = total salary and wage duties for the company.

$$SCE = SC/VA$$

where: SCE = structural capital efficiency for the company; SC = structural capital; VA = value added.

The VAIC model can thus be formulated as follows (Soewarno & Tjahjadi, 2020):

$$VAIC = HCE + CEE + SCE$$

where: VAIC = value added intellectual coefficient; HCE = human capital efficiency; CEE = capital employed efficiency; SCE = structural capital efficiency.

The dependent variable in this study is financial performance using the ROA, ROE, and ATO ratios. These measures were adopted by Soewarno and Tjahjadi (2020) and are which are formulated as follows:

$$ROA = earnings\ after\ tax/total\ assets$$

$$ROE = earnings\ after\ tax/total\ equity$$

$$ATO = total\ sales/total\ assets$$

The control variables of firm size and leverage were adopted from Olarewaju and Msomi (2021) and Chowdhury et al. (2019) and are formulated as follows:

Size = logarithm of total assets

Leverage = total debt/total assets

We examine the relationship between VAIC performance and financial performance (ROA, ROE, and ATO) in the banking sector in Indonesia. Thus, we propose six models, as follows:

Model 1: $ROA_{it} = \beta_0 + \beta_1\,VAIC_{it} + \beta_2\,LEV_{it} + \beta_3 SIZE_{it} + \varepsilon_{it}$

Model 2: $ROE_{it} = \beta_0 + \beta_1\,VAIC_{it} + \beta_2\,LEV_{it} + \beta_3 SIZE_{it} + \varepsilon_{it}$

Model 3: $ATO_{it} = \beta_0 + \beta_1\,VAIC_{it} + \beta_2\,LEV_{it} + \beta_3 SIZE_{it} + \varepsilon_{it}$

Model 4: $ROA_{it} = \beta_0 + \beta_1\,HCE_{it} + \beta_2\,CEE_{it} + \beta_3 SCE_{it} + \beta_4 LEV_{it} + \beta_5 SIZE_{it} + \varepsilon_{it}$

Model 5: $ROE_{it} = \beta_0 + \beta_1\,HCE_{it} + \beta_2\,CEE_{it} + \beta_3 SCE_{it} + \beta_4 LEV_{it} + \beta_5 SIZE_{it} + \varepsilon_{it}$

Model 6: $ATO_{it} = \beta_0 + \beta_1\,HCE_{it} + \beta_2\,CEE_{it} + \beta_3 SCE_{it} + \beta_4 LEV_{it} + \beta_5 SIZE_{it} + \varepsilon_{it}$

where: ROA = return on assets; ROE = return on equity; ATO = asset turnover; VAIC = value added intellectual coefficient; HCE = human capital efficiency; CEE = capital employed efficiency; SCE = structural capital efficiency; LEV = leverage; SIZE = firm size; ε = error, i = bank, t = time period.

4. Empirical Results

4.1. Descriptive Statistics and Correlation Matrix

Table 2 contains the descriptive statistics, which include the size of the observation and the mean, standard deviation, and the min and max values of each variable studied. For ROA and ROE, the mean values are 0.004 and 0.019, which indicates that the average financial performance of the companies (ROA and ROE) is relatively low, while the mean ATO value is 0.405, indicating a relatively high average financial performance of the bank companies. The VAIC value has a mean of 7.445, which means that on average, bank companies are high efficiency in creating added value.

Table 2. Descriptive Statistics

Variables	Obs	Mean	Std. dev.	Min	Max
ROA	205	0.004	0.028	-0.181	0.102
ROE	204	0.019	0.113	-0.732	0.209
ATO	206	0.405	0.720	0.000	3.879
VAIC	207	7.445	1.967	2.324	1.345
HCE	208	6.508	1.960	1.764	1.268
CEE	208	0.126	0.108	0.056	0.886
SCE	208	0.832	0.055	0.433	0.921
LEV	210	0.853	0.787	0.050	8.604
SIZE	210	31.27	1.766	27.22	35.08

Source: Authors' Calculations.

HCE has a mean value of 6.508 and a standard deviation of 1.960 which indicates a small variation. CEE has a mean value of 0.126 and a standard deviation of 0.108, which also denotes a small variation. SCE has a mean value of 0.832 and a standard deviation of 0.055, indicating a very small variation. LEV has a mean value of 0.8, which denotes that the bank companies' average level of debt exceeds their assets. SIZE has a mean value of 31.27, which reveals that the average bank company is very large.

Table 3. Correlation Matrix

Variables	ROA	ROE	ATO	VAIC	HCE	CEE	SCE	DAR	SIZE
ROA	1.000								
ROE	0.782***	1.000							
ATO	-0.063	-0.114*	1.000						
VAIC	0.084	0.103	0.242***	1.000					
HCE	0.082	0.100	0.234***	0.997***	1.000				
CEE	0.058	0.082	-0.068	-0.026	-0.085	1.000			
SCE	0.122*	0.133*	0.250***	0.898***	0.889***	-0.044	1.000		
LEV	-0.008	-0.051	0.166**	0.061	0.060	-0.006	0.054	1.000	
SIZE	0.336***	0.448***	-0.320***	0.041	0.024	0.139**	0.105	-0.072	1.000

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$,
Source: Authors' Calculations.

The correlation coefficients in Table 3 show the extent of the relationship between IC and the financial performance of banking firms. It can be seen that VAIC, HCE, and CEE are positively correlated while leverage is negatively correlated with ROA and ROE as measures of bank company performance that are considered statistically insignificant. Meanwhile, SCE and firm size were found to be positively correlated with ROA at the 10% (SCE) and 1% (firm size) levels of significance. VAIC, SCE, firm size, and leverage were found to be positively correlated with ATO at the 1% (VAIC, SCE, and firm size) of 5% (leverage) levels of significance. However, CEE was found to be negatively correlated with ATO, which was considered statistically insignificant.

4.2. Regression Results and Discussions

Panel data analysis was used to estimate the unbalanced panel data in the research model, which is the same approach that was taken by Ozkan et al. (2017). All variables (except LEV and SIZE) were winsorized at the 0th and 99th percentiles (VAIC, HCE, CEE, and SCE) or the 1st and 99th percentiles (ROA, ROE, and ATO). Winsorizing moderates the effect of outliers on the mean and variance and thereby creates a more robust estimator of location and variability (Blaine, 2010). The result of the Shapiro-Wilk test for normality indicates that the distribution of the residual data was not normal. The next step was to estimate the panel data model between pooled OLS, fixed effects model, and the random effects model. The methods used to estimate the best panel data model comprised the F test (estimation between pooled OLS and fixed effects model), Hausman test (estimation between the fixed effect and random effects models), and LM test (estimation between the random effects model and pooled OLS).

Based on the estimation results of the panel data model selection, the best random effects model is on models 1, 2, 3, 4, 5 and 6. We used robust standard error in the random effects

model to prevent autocorrelation and heteroskedasticity in all models (in Table 4). Table 4 contains the results of the panel data regression using a random effects model on the formulated models (models 1, 2, 3, 4, and 5).

The results for models 1, 3 and 5 show a significant and positive relationship between VAIC and financial performance (ROA, ROE, and ATO) in bank companies during the 2017-2021 period. This finding is in line with RBT on bank companies in Indonesia and is consistent with prior research by Smriti and Das (2018) on Indian firms listed in COSPI. The R^2 value in the VAIC model indicates a small effect on the financial performance of the bank companies. This corresponds with the result reported by Tran and Vo (2018) in their on banks in Thailand and those of Ozkan et al. (2017) for the Turkish banking sector. As a result, hypotheses H1, H2, and H3 are accepted.

Table 4. Regression Results

	ROA	ROE	ATO	ROA	ROE	ATO
VAIC	0.0021**		0.0072*		0.0171*	
	(2.0107)		(1.7574)		(1.9283)	
HCE		0.0009		0.0019		0.0004
		(0.5351)		(0.4441)		(0.0093)
CEE		0.0056		0.0309		0.0225
		(0.9807)		(1.2857)		(1.3569)
SCE		0.0522		0.2075*		-0.1541
		(1.2961)		(1.7705)		(-0.5498)
LEV	0.0004	0.0004	0.0007	0.0008	0.0229***	0.0227***
	(0,6343)	(0,6094)	(0,7515)	(0,7619)	(3,1504)	(3,2156)
SIZE	0.0046***	0.0044***	0.0275***	0,0268***	-0.1705***	-0.1713***
	(3.181)	(2.9509)	(6.1514)	(5.9561)	(-4.2214)	(-4.2567)
Constant	-0.1552***	-0.1836	-0.8972***	-1.0106	5.6132***	5.7478***
	(-2.9566)	(-3.5461)	(-6.0311)	(-5.9308)	(4.2251)	(4.3106)
Observation	202	201	201	200	203	202
R-square	0.0235	0.0254	0.0302	0.0361	0.1941	0.1954
Wald Chi2	10.44	41.60	23.51	14.50	43.59	26.12
F (p)	0.0152	0.0128	0.0000	0.0000	0.0000	0.0001

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Authors' Calculations.

Models 2, 4, and 6 show the results for the effect of the VAIC components (HCE, CEE, and SCE) on financial performance (ROA, ROE, and ATO). Based on these models, HCE does not significant effect on the financial performance (ROA, ROE, and ATO) of bank companies. Therefore, hypotheses H1a, H2a and H3a are rejected. This finding is consistent with research conducted in Bangladesh by Chowdhury et al. (2018, 2019) in Bangladesh, who reported that HCE was not significant to ROE and ATO. Kasoga (2020), in a study carried out in Tanzania, also found that HCE was not significant to ROA and ATO.

The relationship between CEE and financial performance (ROA, ROE, and ATO) was found to have no significant effect. This is consistent with Chowdhury et al. (2018), who also reported no significant effect of CEE on financial performance (ROA, ROE, and ATO) in Bangladesh. As such hypotheses H1b, H2b, and H3b are rejected. Additionally, no significant effect was found for the relationship between SCE and both ROA and ATO. This is consistent

with Xu and Liu (2020) in their study in South Korea, where they found that SCE was not significant to ROA and ATO.

However, SCE was found to have a positive and significant effect on ROE. This shows that Indonesian bank companies must invest heavily in the use of technology and company supporting facilities, which are the driving force of financial performance in terms of ROE. These results are also consistent with those of previous studies (Poh et al., 2018b; Xu, Liu, 2020). Hypotheses H1c and H3c are therefore rejected, but H2c is accepted. The R^2 value in the VAIC component was found to have only a small effect on the financial performance of bank companies. In terms of the control variables, ATO is significantly affected by leverage and firm size, although the effect of firm size is negative. Firm size has a considerable influence on ROE.

5. Conclusions and Limitations

In light of the intensifying competition between companies in the Indonesian banking sector, businesses can improve their performance and build competitive advantage using a strategy that involves the recognition and creation of IC. Therefore, understanding the significant contribution made by IC and its components is necessary. This study contributes to realizing the objective by providing market evidence from the developing banking sector for VAIC as a measure of IC and VAIC components. Additionally, the study fills a gap in the literature (SCE, CEE, and HCE).

Table 5. Hypothesis Testing

Hypotheses	Supported/Rejected
H1. The VAIC model has a positive relationship with ROA	Supported
H2. The VAIC model has a positive relationship with ROE	Supported
H3. The VAIC model has a positive relationship with ATO	Supported
H1a. HCE has a positive relationship with ROA	Rejected
H1b. CEE has a positive relationship with ROA	Rejected
H1c. SCE has a positive relationship with ROA	Rejected
H2a. HCE has a positive relationship with ROE	Rejected
H2a. CEE has a positive relationship with ROE	Rejected
H2c. SCE has a positive relationship with ROE	Supported
H3a. HCE has a positive relationship with ATO	Rejected
H3b. CEE has a positive relationship with ATO	Rejected
H3c. SCE has a positive relationship with ATO	Rejected

Source: Authors' Calculations.

The results of the study show that VAIC makes a strong contribution to improving the financial performance of banking companies in Indonesia. The reasonably significant average VAIC value in banking companies, 7.445, indicates that they should maximize the effective use of IC in improving financial performance and promoting stability in the banking market. Following RBT, companies with effective and efficient resources can enhance their competitive advantage and deliver superior performance. In line with the opinion of

Chowdhury et al. (2018), the industry can develop the effective use of IC to increase existing profit margins through higher productivity and greater efficiency.

However, given that the VAIC component in HCE and CEE does not contribute to improving financial performance as measured by ATO, these findings indicate that the effect of the VAIC component differs quite considerably. This is because banks in Indonesia need to be more efficient and effective in managing their capital and employees in terms of their contribution to improving financial performance. Management should therefore pay greater attention to the use of capital and the knowledge and skills of employees to improve company performance. This supports the opinion presented by Kasoga (2020) that a combination of these elements will result in more significant innovation in products or services, and processes.

Based on the research findings, SCE significantly affects ROE but does not affect ROA and ATO. While there is an effect on ROE, companies can further improve their financial performance on other measures through technology and supporting facilities, which can be a starting point for improving strategic IC performance (Chowdhury et al., 2018). While this study has many limitations beyond the scope of the current discussion, the researcher provides the following suggestions for further research. Despite the high level of emerging business competition in Indonesia, this study has considered only the banking sector.

This study uses secondary data and employs panel data analysis to examine the impact of IC on Financial Performance in bank companies listed on the IDX. In addition, this study also controls for heteroscedasticity and autocorrelation problems by using robust standard errors. However, there are some limitations that the number of samples studied is not too large. Therefore, for future research, it can include samples of bank companies that are not public to get a larger data sample. In addition, it can add some studies in neighbouring countries such as in Southeast Asia etc.

Further research is therefore required in other industries, including manufacturing, textiles, or food and beverages, to expand the actual knowledge and evaluate the IC findings from this study in different sectors in Indonesia. In addition, this study has only discussed the influence of IC on financial performance. Further research may therefore examine the relationship between corporate governance and IC, given its importance, as a critical element in the management of companies for competitive advantage in the increasingly advanced industrial revolution era.

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