

The Impact of Intellectual Capital on Financial Performance of Nonfinancial Listed Companies in Indonesia Stock Exchange

Muhammad Hadyan^{1*}, Willem Makaliwe¹

¹ Faculty of Economic and Business, University of Indonesia, Jakarta, Indonesia

*Corresponding Author: muhammad.hadyan@ui.ac.id

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Abstract: *The shift from physical-resource-based economies to knowledge-based economies has caused researchers to look for a new way to measure intangible assets, including intellectual capital. The objective of this research is to examine the impact of Intellectual Capital on a firm's performance. The method used in this research is A-VAIC (Adjusted Value Added Intellectual Coefficient) which consists of HCE (Human Capital Efficiency), INVCE (Innovation Capital Efficiency), and CEE (Capital Employed Efficiency). The multiple regression analysis is employed to test the hypotheses studied. The sample used in this research is 48 nonfinancial companies listed on Indonesia Stock Exchange from 2010 to 2019. This research found that A-VAIC has a significant positive effect on a firm's performance. The result shows that Intellectual Capital had positively influenced a firm's performance. The findings may be used as a reference for the manager to effectively and efficiently manage Intellectual Capital, leading to a better firm's performance.*

Keywords: Intellectual Capital, Firm's Performance, A-VAIC, Innovation Capital

1. Introduction

Developments in technology and science have led companies to change the principles of conventional business concepts, regarding labour-based business into a knowledge-based business. Based on Nuryaman (2015), economic development will depend on applying knowledge in this era. Therefore, companies rely on management to manage the skills and knowledge of employees in creating sustainable competitive advantage.

Furthermore, Roos, Roos, Dragonetti, and Edvinsson (1997) show that several companies such as General Electric, Coca-cola, Exxon, Microsoft, and Intel are already based on science, technology and innovation tend to have much higher market value. Compared to the valuation of a company's tangible assets, the existence of hidden value is assumed to be an indicator of the company's use of Intellectual Capital. So, the market value of a company differs from the value of its assets.

The implementation and disclosure of Intellectual Capital in Indonesia were still low until 2012. Based on Nugroho (2012) shows, the difficulty in measuring the Intellectual Capital component causes management not to disclose Intellectual Capital in its financial statements. By not considering the company's Intellectual Capital aspects, Indonesia's companies are still applying the traditional accounting reporting system. The conventional accounting reporting system causes the company's financial reports not to provide information about intangible assets, especially intellectual capital, which is considered necessary in building added value (Sawarjuwono & Kadir, 2004). In other words, if Intellectual Capital is not recognized in the

financial statements, there would be a substantial gap in valuation between market value and firm value in the financial statements, causing management decision-making to be inconsistent with actual market conditions.

Pulic (1998) developed the Value-Added Intellectual Coefficient (VAIC) model, a monetary-based intellectual capital measurement model designed to measure intellectual capital efficiency across industries. Furthermore, according to Pulic (2004), value-added is an indicator of business success. It reflects a company's ability to generate value. It also requires financial investments, such as salary and interest on financial assets, dividends to investors, state taxes, and future development investments. Pulic's VAIC model has been widely used in research and business practices to measure intellectual capital efficiency (Nadeem et al., 2018).

The impact of intellectual capital on company performance has yielded a variety of outcomes. Ulum, Kharismawati, and Syam (2017) investigated Indonesian companies' financial performance using the Modified Value Added Intellectual Capital (MVAIC) method on the financial performance of companies in Indonesia. According to the results of this report, businesses with higher intellectual capital have better financial performance. Findings on Nuryaman's (2015) research, intellectual capital, has a significant positive relationship with companies' financial performance in Indonesia.

In contrast to the findings Ulum et al., (2017) and Nuryaman (2015), Maditinos, Chatzoudes, Tsairidis, and Theriou (2011) indicate that a company's Intellectual Capital does not affect the financial performance. The reason is that developing countries devote less attention to the company's intangible assets or intellectual capital due to a lack of current accounting practices and a mature financial structure.

Those inconsistent results in intellectual capital studies could be due to unclear measurements. Some critics on the conventional VAIC model have been stated by some scholars (Maji and Goswami, 2017; Nadeem et al., 2018; Vishnu and Gupta, 2014). Nadeem et al. (2018) suggested the adjusted Value-Added Intellectual Coefficient (A-VAIC) model as one of the attempts to reconstruct the VAIC model. One of the intellectual capital components, structural capital, is replaced with innovation capital measured from R&D, which is the essence of the VAIC reconstruction model into the A-VAIC model.

A recent study conducted by Nadeem et al., (2018) shows that intellectual capital with the components of human capital, innovation capital and employed capital has a positive relationship with the company's financial performance as measured by return on assets, return on equity, asset turnover and price to book value. In contrast with Vishnu and Gupta (2014) and Bayraktaroglu et al., (2019) found that innovation capital, as measured by R&D expenses, has no relationship with return on assets. In Indonesia, Soewarno and Tjahjadi used the Intellectual Capital measurement model proposed by Nadeem et al., (2018) to investigate the effects of intellectual capital on banking companies' success (2020). Intellectual Capital, as measured by Innovation Capital, is unrelated to return on equity in Indonesian banking companies, according to research by Soewarno and Tjahjadi (2020). This result contradicts Nadeem et al., (2018) and Bayraktaroglu et al., (2019).

This study using the A-VAIC model by Nadeem et al., (2018) should be regarded as a significant contribution towards better measurement of intellectual capital and its relationship with financial performance. Departing from the phenomena that already described, this study provides further evidence for further studies of how intellectual capital can be measured using

secondary or capital market data. A new data set has been established for this study. Non-financial industry companies listed on the Indonesia Stock Exchange are chosen because they provide empirical evidence in intellectual capital theory and literature in Indonesia as an emerging economy.

2. Literature Review

Resource Based Theory

The resource-based theory explains that the company should achieve a competitive advantage by managing its resources (Wernerfelt, 1984). Pulic and Kolakovic (2003) state that each enterprise has unique knowledge, skills, values, and solutions. All of those are called as an intangible asset that can be converted into a market value. Also, corporate resources include all assets, company capabilities, business processes, company attributes, information, knowledge, and others (Barney, 1991). The company can control all of these resources to achieve effective and efficient business processes. Therefore, it is understandable that the resources used by the company must be able to create added value from the resource's competitive advantage. In addition, Barney (1991) argued that resources need to be potential with criteria, namely, valuable, scarce, not easily imitated, and not replaced by other resources, if a company wants to have good, long-term business performance.

Stakeholder Theory

According to Freeman and Reed (1983), stakeholders' rights exist in the business process, especially regarding the company's business activities. As a result, management must prioritize the effective and efficient use of resources and their application in the overall business process to achieve a positive impact or benefit for stakeholders (Freeman and Reed, 1983). The goals are designed to allow management to understand and carry out activities that can positively impact or benefit all stakeholders. So, every management decision is expected to create value from all company activities (Ulum, 2015).

Effective and efficient resource management enables the creation of added value for the business and its stakeholders. Additionally, Riahi-Belkaoui (2003) states that stakeholders are concerned with various factors, including customer satisfaction, employee enrichment, and social performance. In essence, stakeholders have the right to information on the company's business activities that influence company decision-making. This decision is also inseparable from a company's achievement so that a company does not work only operates for the company's survival.

Therefore, to create added value and form a sustainable competitive advantage, companies need to have competence in utilizing the resources used by the company. Barney (1991) also states that owned resources must have potential with criteria, namely, valuable, rare, not easy to imitate, and cannot be replaced with other resources. Moreover, using these resources cannot be separated from the rights of stakeholders who play an important role in making decisions based on information transparency from a company's achievements. As a result, the company can achieve good company performance.

Intellectual capital and company performance

It is explained in the discussion of Resource-Based Theory that companies that are skilled in managing and using company resources effectively and efficiently reflect the level of competitive advantage. Klapper and Love (2002) believe that the advancement of science and technology has the potential to regulate the use of company resources to make them more

effective and efficient. Furthermore, Ulum et al. (2017) stated that Resource-Based Theory is the best fit for studying the relationship between intellectual capital and firm performance. In the previous Stakeholder Theory discussion, it is explained that management must prioritize the effective and efficient use of resources in the company's business processes to create added value for the company and stakeholders.

The relationship between intellectual capital and company performance was previously explored and revealed in theory and practice by several previous researchers. Pulic's VAIC model (1998,2003) is gaining popularity among researchers and firms in measuring the efficiency of using intellectual capital. This popularity can occur due to several conveniences and advantages created by the VAIC model. One example is the VAIC model using published data from audited financial statements to increase the reliability of research results. Several new studies have tried to confront the VAIC model by introducing new Intellectual Capital components such as Innovation Capital, Process Capital, and Customer Capital or Relational Capital. The growing intellectual capital has attracted many parties to conduct more profound studies. Firer and Williams (2003) initiated the criticism of the VAIC model, followed by Bontis et al. (2007), to change the measurement of one of the Intellectual Capital components in the VAIC model, namely structural capital.

A recent study by Nadeem et al. (2018) showed that intellectual capital with its components of human capital, innovation capital, and employed capital has a positive relationship with the company's financial performance, measured by return on assets, return on equity, asset turnover, and price to book value. In contrast with studies by Vishnu and Gupta (2014) and Bayraktaroglu et al. (2019), which found that innovation capital, as calculated by R&D expenses, has no relationship with return on assets. In Indonesia, Soewarno and Tjahjadi used the Intellectual Capital calculation model proposed by Nadeem et al. (2018) to investigate the impact of intellectual capital on the success of banking companies (2020). According to the findings of Soewarno and Tjahjadi (2020) study, banking companies in Indonesia have an innovation capital productivity that is unrelated to return on equity. Therefore, the following hypotheses can be formulated from the results of the discussion of the basic theory used and the differences in previous studies results:

- H1 : Intellectual Capital has a significant positive relationship with return on asset.
- H2 : Intellectual Capital has a significant positive relationship with return on equity.
- H3 : Intellectual Capital has a significant positive relationship with asset turnover.
- H4 : Intellectual Capital has a significant positive relationship with price to book value.

Based on the descriptions and explanations that have been presented, the research framework is as follows:

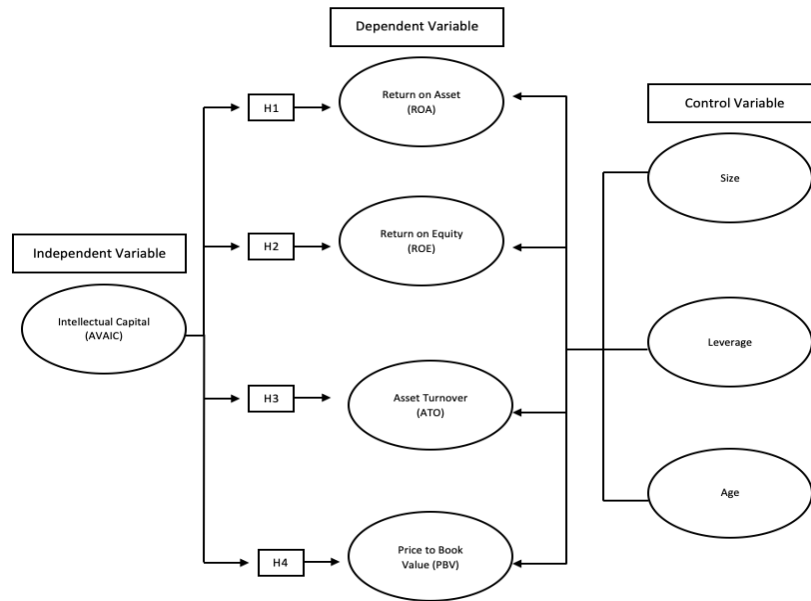


Figure 1: Research Framework

3. Methodology

This research is a quantitative study that is used to investigate a specific population or sample, data is collected using research instruments, and data analysis are quantitative/statistical to test the hypothesis that has been applied. This study uses multiple linear regression because the independent variable is more than one. Intellectual capital is the independent variable in this analysis, with components such as human capital efficiency, innovation capital efficiency, and capital employed efficiency. While return on assets, return on equity, asset turnover, and price to book value are the dependent variables. This research uses numerous control variables, including firm size, leverage and company age.

Secondary data used in this study comes from the annual financial reports of all non-financial companies listed on the Indonesia Stock Exchange from 2010 to 2019 via the Indonesia Stock Exchange's official website (<http://www.idx.co.id>), and financial data is obtained from Thomson Reuters as the study sample. Table 1.1 contains an overview of the research data collection process.

Table 1.1: Research Sample Selection

Description	Samples of Company	Observation
The number of companies listed on the IDX in 2019	735	7.350
Companies in the financial sector	(151)	(1.510)
Number of companies that have incomplete data	(536)	(5.360)
The number of companies used as research samples	48	480

The number of companies listed on the Indonesia Stock Exchange in 2019 was 735, but 151 financial industry companies had to be excluded from the research sample because they did not meet the research criteria. In addition, 536 firms were excluded from the research, as the firms did not provide robust research data.

The adjusted VAIC (A-VAIC) model of Nadeem et al. (2018) has different independent variables of intellectual capital components, namely HCE, innovation capital efficiency (INVCE) and CEE. The first phase is calculating VA using the following formula:

$$VA = NI+LC+I+DP+R\&D$$

The VA is the sum of net income (NI), labor cost (LC), interest (I), taxes (T), depreciation and amortization (DP), research and development (R&D). The intellectual capital component is calculated using the following formula:

$$\begin{aligned} HCE &= VA/HC \\ INVCE &= VA/INVC \\ CEE &= VA/CE \\ A-VAIC &= HCE+INVCE+CEE \end{aligned}$$

HCE is the ratio of VA/HC derived from total salaries and wages. INVCE is the ratio of VA/INVC. Innovation capital (INVC) is represented by R&D investment and copyrights. CEE is the ratio of VA/CE and CE is the book value of total assets. Dependent variables in this study consist of ROA (return on asset) calculated by earning after tax/total assets, ROE (return on equity) calculated by earning after tax/total equity, ATO (asset turnover) calculated by total sales/total assets and PBV (price-to-book value ratio) calculated by value of market price/book value. Independent variables consist of the A-VAIC components, namely HCE, INVCE and CEE. Control variables in this study consist of leverage calculated by total debt/total assets, firm size calculated by the natural log of total assets and firm age calculated by firm's age.

The A-VAIC is a modification of the VAIC (Nadeem et al., 2018; Vishnu and Gupta, 2014). According to Nadeem et al. (2018), the A-VAIC model produces the following regression equations:

Model 1:

$$ROA = \beta_0 + \beta_1 A-VAIC + \beta_2 LEV + \beta_3 SIZE + \beta_4 AGE + \epsilon$$

Model 2:

$$ROE = \beta_0 + \beta_1 A-VAIC + \beta_2 LEV + \beta_3 SIZE + \beta_4 AGE + \epsilon$$

Model 3:

$$ATO = \beta_0 + \beta_1 A-VAIC + \beta_2 LEV + \beta_3 SIZE + \beta_4 AGE + \epsilon$$

Model 4:

$$PBV = \beta_0 + \beta_1 A-VAIC + \beta_2 LEV + \beta_3 SIZE + \beta_4 AGE + \epsilon$$

Descriptive Statistic

Descriptive statistics is a tool for exploring data. Descriptive statistics can use to consolidate and make it easier to understand. Each variable's average (Mean), standard deviation, minimum and maximum values are included in the table 1.2.

The independent variable Intellectual Capital (AVAIC) has a mean value of 459.1518 in this study. PT Indomobil Sukses Internasional Tbk, with an AVAIC value of 10064.224, is the

company that uses the most Intellectual Capital; meanwhile, PT Bentoel International Investama Tbk owns the company with the lowest AVAIC value of 0.8719.

Table 1.2 Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROA	0,0821	0,1475	0,0007	2,8810
ROE	0,2496	1,0562	0,0010	20,311
ATO	1,0536	0,8963	0,0003	8,7500
PBV	5,4147	22,4018	0,0181	327,953
AVAIC	459,1518	1020,425	0,8719	10064,22
AGE	36,3125	16,0344	2,0000	89,0000
LEV	0,2541	0,4051	0,0000	3,5700
SIZE	28,8522	2,0126	22,9036	32,4057

Description: ROA : Return on Asset, ROE : Return on Equity, ATO : Asset Turnover, PBV : Price to Book Value, AVAIC : Adjusted Value Added Intellectual Coefficient, AGE : Firms' Age, LEV : Leverage, SIZE : Company Size

Control variables were consisting of Company Size, Leverage, and Age. The average value for the variable Company Size (SIZE) is 28.8522. With a Size value of 32.4057, PT Charoen Pokphand Indonesia Tbk is the company with the largest company size. PT Jakarta Kyoei Steel Works Tbk owns the company with the smallest Size value of 22,9036. The Leverage variable, on the other hand, has an average value of 25.41 percent. PT Jakarta Kyoei Steel Works Tbk (JKSW) and PT Alakasa Industrindo Tbk (ALKA), with 357 percent and 0 percent, respectively, own the maximum and minimum Leverage data values. When it comes to the age of the companies in the sample, PT Bentoel Internasional Investama Tbk is the oldest, having been in operation for 89 years. Furthermore, PT Intermedia Capital Tbk is the newest company in the entire research sample, founded two years before 2010.

Multiple Regression Analysis

Hypothesis testing on research models 1,2,3 and 4 was carried out to see the impact of the Adjusted Value Added Intellectual Coefficient (A-VAIC) on Return on Assets (ROA), Return on Equity (ROE), Asset Turnover (ATO), and Price to Book Value (PBV) with a total of 480 observation data based on the research period 2010-2019.

The determination coefficient (R²) shows 0.0498, 0.0073, 0.0157 and 0.0083, respectively, for each research model (Table 1.13). The independent variables and control variables can explain 0.49 percent, 0.073 percent, 1,57 percent, and 0.83 percent changes in the correlation on dependent variables for each research model. Furthermore, the value of Prob>Chi² research models 1 and 3 shows a value of 0,000, so it is suitable for the research models 1 and 3 to explain the relationship between intellectual capital and company performance. But the model 2 and 4 failed to do so. In other words, the independent variable and the control variable simultaneously have a significant effect on the dependent variable.

Table 1.3: Results of Multiple Regression Analysis on ROA and ROE

VARIABLE	Research Model 1 (Dependent Variable : ROA)			Research Model 2 (Dependent Variable : ROE)		
	Coef.	P> z	Result	Coef.	P> z	Result
AVAIC	0,00003	0,000***	(+) Sig	0,00002	0.694	(+) non Sig
AGE	-0.0019	0,045**	(-) Sig	-0,0037	0.475	(-) non Sig
LEV	0.0834	0,000***	(+) Sig	0.2294	0.230	(+) non Sig
SIZE	0.007	0,123	(-) non Sig	-0.0010	0.979	(-) non Sig
_cons	-0,1139	0,394		0,3473	0,756	
Prob>chi2		0,0000		0,7494		
Overall R-squared		0,0498		0,0073		

***Significance level at 1%, **significance level at 5%, *significance level at 10% Description: ROA : Return on Asset, ROE : Return on Equity, AVAIC : Adjusted Value Added Intellectual Coefficient, AGE : Firms' Age, LEV : Leverage, SIZE : Company Size

Based on Table 1.3, research model 1 shows that A-VAIC has a significant positive effect on financial performance (ROA) at a significance level of 1 percent. Meanwhile, A-VAIC has no influence on financial performance (ROE). Age variable has an effect on these two dependent variables. The variable Company Size (SIZE) has a negative effect on ROA and ROE. In addition, the Leverage variable has a significant positive effect on the ROA but no effect on company ROE.

Table 1.4: Results of Multiple Regression Analysis on ATO and PBV

VARIABLE	Research Model 3 (Dependent Variable : ATO)			Research Model 4 (Dependent Variable : PBV)		
	Coef.	P> z	Result	Coef.	P> z	Result
AVAIC	0,00005	0.063*	(+) Sig	0,00087	0.489	(+) non Sig
AGE	-0,0086	0.061*	(-) Sig	-0,157	0.159	(-) non Sig
LEV	-0,3927	0.000***	(-) Sig	2,434	0.547	(+) non Sig
SIZE	-0,0431	0.066*	(-) Sig	1,2416	0.124	(+) non Sig
_cons	2,6890	0.000		-25,726	0,275	
Number of Obs				480		
Number of Groups				48		
Prob>chi2		0,0000		0,3073		
Overall R-squared		0,0157		0,0083		

***Significance level at 1%, **significance level at 5%, *significance level at 10% Description: ATO : Asset Turnover, PBV : Price to Book Value, AVAIC : Adjusted Value Added Intellectual Coefficient, AGE : Firms' Age, LEV : Leverage, SIZE : Company Size

Table 1.4 showed that A-VAIC has an influence on financial performance Asset Turnover (ATO) at 10% significance level. Then the book value price (PBV) has a value of $P > |z|$ 48.9%, so A-VAIC did not have a significant effect on PBV. The variable age and leverage are variables that significantly affect the Ato and ROA. Furthermore, the variable Company Size (SIZE) has no significant effect on ROA while it has a significant negative relationship to ATO with a significance level of 10 percent.

4. Conclusion

The effect of Adjusted Value Added Intellectual Coefficient (AVAIC) on Company Performance

Intellectual Capital has a significant positive effect on company performance, according to the hypothesis test in research model 1 and 3. In this way, the company will increase its performance if it can successfully manage the utilization of Intellectual Capital. However, the performance of the company will decrease if the company cannot manage Intellectual Capital properly.

According to Maditinos et al. (2011), developing countries continue to rely on traditional business models that do not value intellectual capital as a valuable resource. Unlike other developing countries, Indonesian companies have also considered the use of intellectual capital to support company performance. It is indicated that Indonesia's business sample has shifted from a conventional-based economy to a knowledge-based economy.

Companies that are adept at managing and utilizing company resources effectively and efficiently can gain a competitive advantage, as stated in Resource-Based Theory (Wernerfelt, 1984). In line with Nimtrakoon's (2015) research, Intellectual Capital has a unique role in building competitive advantage among enterprises as an intangible resource. According to the research sample in Indonesia, if management concerned with managing the use of Intellectual Capital will also have an easier time improving the company's financial performance.

As stated by the resource-based theory, innovation capital must meet the criteria of valuable, rare, inimitable and nonsubstitutable. If the firm ignores those characteristics, innovations will not optimally generate more profit. This study does not support a study by Vishnu and Gupta (2014) and Bayraktaroglu et al. (2019) showing that innovation capital in the form of R&D does not affect financial performance measured by ROA. However, this study supports the study of Nadeem et al. (2018) revealing that a new measurement for structural capital is needed and it is proven that A-VAIC model affects profitability. In conclusion, the A-VAIC model provide evidence that is in line with the innovation theory.

In the contrary, the A-VAIC model has no effect on ROE of the Indonesian firms listed in Indonesia Stock Exchange. This study fails to prove that innovation capital management will produce more wealth for capital owners. The lack of R&D investment in the Indonesia Company might be one of the reasons. This result does not support the study of Nadeem et al. (2018) and Bayraktaroglu et al. (2019), showing that Intellectual Capital measured by R&D has a positive relationship to ROE. In conclusion, the inconsistent results of the A-VAIC model needs justification for further studies.

Table 1.4 showed that, A-VAIC model prove the effect on ATO has an effect on financial performance in Indonesian companies listed on Indonesia Stock Exchange. This result provides empirical evidence that the increasing AVAIC will enhance the revenue generating

productivity of the Indonesian companies. So, reveals the productivity in utilizing assets to generate revenues. In conclusion, the result is in line with the financial theory and supports some studies of the previous scholars (Firer and Williams, 2003; Komnenic dan Pokrajcic, 2012; Nadeem et al., 2018; Smriti and Das, 2018).

Table 1.4 also demonstrated that the A-VAIC model fails to prove the effect on PBV. Thus, hypotheses 4 are not supported. This result does not support the study of Nadeem et al. (2018) revealing that A-VAIC affects PBV. Similarly, the A-VAIC model also fails to prove the effect of INVCE on PBV. In conclusion, this result is not in line with the innovation theory.

The knowledge-based economy has shifted the strategic role of physical assets into intangible assets. Therefore, scholars are challenged to find a new way to measure intellectual capital using financial statements. This study aims to investigate the effect of intellectual capital elements (HCE, CEE and INVCE) on financial performance measured by ROA, ROE, ATO and PBV.

This study tries to confront the conventional VAIC model of Pulic (2004) with the adjusted VAIC model by Nadeem et al. (2018). Both the VAIC model and the A-VAIC model demonstrate the same results on the effect of human capital on ROA as well as the effect of structural capital and innovation capital on return on asset.

Employing multiple regression analysis, the results confirm that intellectual capital affects financial performance. Although not all hypotheses are supported by the A-VAIC model, this study provides a deeper and new insight on how each component of intellectual capital efficiency (human capital, capital employed, innovation capital) relates to financial performance (ROA, ROE, ATO, PBV). Further improvements in measuring each element of intellectual capital are still needed in the future to deal with some inconsistent results.

These findings justify that although the effect of intellectual capital on financial performance is confirmed, the development of a more accurate measure of each element of intellectual capital is still needed in the future to generate more consistent results.

Limitation and Future Research

This study has the following limitations. This research has several limitations, including that the sample size is relatively small and limited to (IDX). As a result, caution should be exercised when applying the findings of this study to broader applications. Future research should include bigger sample size, such as having non-go public enterprises and firms from other growing Southeast Asian countries. Second, gathering complete time series data might be challenging in emerging countries, which can complicate research. Future research should continue to generate a new data set for each component of intellectual capital and a better way to quantify it. Future research should concentrate on developing new secondary data metrics for each piece of intellectual capital. Using primary data to assess the impact of intellectual capital on financial performance will be fascinating research. Furthermore, future research could broaden the sample by covering industries that rely heavily on intellectual capital, such as manufacturing, trading, services, and other financial services.

Researchers should conduct comparative studies in other rising countries to study the impact of intellectual capital on financial performance in the future. Despite its limitations, this study adds to the theoretical and practical basis for a better understanding of the relationship between intellectual capital and financial performance. This study suggests that managers of Indonesian

firms should be concerned about their intellectual capital, including devising metrics to quantify it. Intellectual capital has been shown to play a critical role in the financial performance of Indonesian companies listed on the Indonesia Stock Exchange (IDX).

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