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Research Article

The Influence of Intellectual Capital on Firm Value with Profitability as an Intervening Variable: A Study of Healthcare Companies Listed on the Indonesian Stock Exchange from 2019 to 2023

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Abstract.
Historically, economists have focused on physical and human capital as the primary resources enabling companies to drive productive and economic activities. However, over time, knowledge has come to be recognized as a valuable asset, making Intellectual Capital (IC) a crucial determinant of a company's value. This study aims to evaluate the impact of IC on the value of healthcare companies listed on the Indonesia Stock Exchange, with profitability acting as a mediating variable. The research is explanatory and adopts a quantitative approach, with a sample of nine companies. The exogenous variable, VAIC^{TM}, measures IC, while Firm Value is represented by Tobin's Q as the endogenous variable, and profitability, as measured by Return on Assets (ROA), is the intervening variable. The sampling method used is purposive sampling, covering a 5-year period from 2019 to 2023. Path analysis, facilitated by SPSS for Windows 26, was employed for data analysis. The results suggest that VAICTM has a positive influence on Tobin's Q, though the impact is not statistically significant, while it significantly impacts ROA in a positive direction. Profitability, represented by ROA, positively and significantly influences Tobin's Q and serves as a crucial mediator in the relationship between VAIC^{TM} and Tobin's Q.

Keywords: intellectual capital, firm value, profitability

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1. Introduction

Firm value refers to how investors perceive a company's potential to perform at its best in the market, which is closely associated with stock price [1]. Companies that employ the concept of knowledge-based business as a method of generating corporate income will have an impact on changes in corporate value creation [2]. In this context, value creation means maximizing the company's full potential, including the contributions of its employees (human capital), physical assets (physical capital), or structural capital. The effective management of these opportunities can generate significant value for

the organization, thereby enhancing its financial performance. This idea is especially important when considering the role of stakeholders in management decision-making. [3,4] asserts that the function of IC is a crucial factor in determining the value of an organization. As Stakeholder theory proposed by R. Edward Freeman (1984) companies are obligated to create value for all stakeholders, not merely shareholders. This statement highlights the importance of considering the interests of multiple stakeholders—including employees, customers, communities, competitors, suppliers, contractors, and shareholders—when making decisions. The theory posits that effective IC management is regarded as a primary agenda capable of generating value for the company, capital market participants, management, the board of directors, and other stakeholders. IC does not merely discuss the advantages it generates; it also emphasizes the company's capacity to leverage its resources to attain organizational objectives [5].

This research uses the healthcare sector which is one of the industries in the High IC Intensive Industry category classified by Whiting & Woodcock (2011) [6]. Morgan Stanley Capital International and Standard & Poor's (S&P) developed this classification system for utilization among the global financial community. In addition, the healthcare sector is a capital-intensive industry that intensively relies on IC as the main source of innovation in conducting research and development concerning the discovery and production of new medicines because of scientific and technological advances. It is anticipated that this research will serve as a valuable learning tool and provide new insights for researchers, especially those interested in understanding the value-added information generated by IC and its implications for firm value and company profitability.

2. Literature Review

Intellectual capital (IC) is a non-physical asset, making its evaluation difficult and its measurement is challenging. Smith et al. (2001) define IC as intellectual property which is an intangible asset or all elements of the company other than working capital and tangible assets that are the main factors contributing to the company's earning power [7]. IC is an intangible asset that encompasses the knowledge, skills, and experience held by employees, as well as the relationships and processes that facilitate value creation within a given organization. IC refers to non-financial resources and intangible assets that are non-physical in nature, which can be managed by any or all parties and play a role in the value creation process of the organization [8,9]. Therefore, several researchers have created formulas in their research to measure IC. [4] stated that IC exerts a considerable

influence on a financial result of the company by generating value. Consequently, IC merits adequate attention. A prominent method in this regard is the Value-Added Intellectual Capital Coefficient (VAIC^{TM}) technique, which was initially developed by Pulic (2000, 2004, 2008) [10–12]. Pulic posits that the primary objective of VAIC^{TM} is to evaluate the efficacy of the incremental value engendered by the enterprise's intellectual aptitude. In other words, this methodology enables a non-directive appraisal of the enterprise's IC. The fundamental components of VAIC^{TM} can be identified through an examination of the company's resources, specifically physical capital (VACA-Value Added Capital Employed), human capital (VAHU-Value Added Human Capital), and structural capital (STVA-Structural Capital Value Added). The efficacy of VAIC^{TM} in enhancing a company's financial performance is well-documented [13]. The presence of IC can be characterized by the degree to which a company cultivates a motivated workforce capable of supporting the maintenance and enhancement of profitability and corporate value [14].

The profitability ratio assesses a company's capability to generate profits over a specific period by considering its sales and investments [15]. Furthermore, Kasmir (2019) asserts that his ratio offers a comprehensive assessment of management's efficacy. This study uses the Return on Asset (ROA) ratio, a metric that assesses a company's profitability. The ROA ratio shows how well management is using assets to make money, providing a more comprehensive evaluation of the company's financial performance. In addition, [16] states that ROA is preferred over ROE because total equity which is the denominator of ROE is one component of VACA. Using ROE can lead to double counting of equity. VACA is constructed from equity accounts and net income as exogenous variables, so incorporating ROE can create redundancy and distort the analysis.

Firm value represents the per-share amount that could be obtained if the firm's assets were sold at their current market prices [17]. One metric that reflects a company's value is the Tobin's Q ratio. This ratio evaluates how efficiently and effectively management utilizes the company's assets. First introduced by James Tobin in the late 1960s, Tobin's Q takes into account factors like debt, share capital, and total assets. It is considered a popular and straightforward tool for assessing company performance, as it does not require risk adjustments or normalization. Furthermore, Tobin's Q serves as a benchmark for resource utilization, as its calculation accounts for the value of all assets. It is also effective in providing estimates of a company's future value (Perfect and Wiles, 1994) [18].

Ozkan et al., (2017) highlighted in their research that companies anticipate achieving higher ROA values through the enhancement of IC [19]. This expectation arises from the notion that investing in IC can generally enhance the company's overall quality, ultimately leading to increased profitability. This result is consistent with Resource Based Theory (RBT), which posits that a business can sustain its competitive edge by acquiring and leveraging valuable resources. As a result, this situation enhances the company's capacity to generate net profits, despite incurring considerable operating costs, making IC a strategic investment.

The stakeholder theory is predicated on the notion that stakeholders wield considerable influence. This group of stakeholders is the primary consideration for companies when determining whether to disclose or withhold information in financial statements. The stakeholder perspective asserts that corporations should prioritize the interests of stakeholders over those of shareholders when making financial reporting decisions [20]. RBT suggests that a firm's resources encompass all assets, capabilities, organizational processes, company characteristics, knowledge, and other elements under the company's control that empower it to develop and execute strategies aimed at enhancing its efficiency and effectiveness [21]. Research conducted by [22] yielded findings that suggest a correlation between IC and the value of VAIC^{TM}. The study indicates that an increase in VAIC^{TM} value is associated with enhanced corporate performance, which, in turn, fosters an increase in ROA. This, in turn, generates a positive response from investors, thereby potentially amplifying the company's value (Tobin's Q). Different results addressed by research indicate that while IC positively impacts financial performance, no such correlation is observed regarding firm value [23].

The study carried out by Sayyidah&Saifi (2017) and Kazhimy&Sulasmiyati (2019) resulted in a significant influence between IC and firm value [22,24]. Consequently, the first hypothesis is H1: IC significantly affects Firm Value. Chen et al., (2005) demonstrated that IC has a beneficial effect on a company's profitability. Similarly, Margareta and Prasetyo (2020) discovered that despite the fact that IC positively affects financial performance, it doesn't have a direct effect on the firm's value [23]. Thus, H2 is proposed: IC significantly affects Profitability. Indah's (2023) research indicated that financial performance, as represented by profitability, significantly influences firm value. However, Khalifaturofi'ah and Setiawan (2024) reported contrasting findings, showing that profitability, as measured by ROA, does not significantly impact firm value [26,27]. This leads to the third hypothesis, H3: Profitability significantly affects Firm

Value. Additionally, studies by Margareta and Prasetyo (2020) and Appah et al. (2023) confirmed that IC significantly influences firm value when mediated by profitability [9,23]. Therefore, the fourth hypothesis is H4: IC influences Firm Value, with Profitability serving as an intermediary factor.

3. Material and Methods

Referring to Stakeholder theory and RBT as well as the findings of previous research, this study utilizes the path analysis technique, which is a methodological framework employed to assess the impact of intervening variables [28]. The Path Model is a diagram that connects exogenous (X), endogenous (Y) and intervening (Y) variables.

3.1. Sample and data collection

The study focused on all healthcare companies listed on the Indonesia Stock Exchange (IDX) between 2019 and 2023, comprising 28 companies in total. Purposive sampling was employed, a method that involves selecting participants based on specific criteria [29], there are: (1). Healthcare subsector companies that were listed on the Indonesia Stock Exchange for the 2019-2023 period. (2) Present financial reports that have been audited sequentially in 2019-2023, and (3). The companies in this subsector show a positive profit margin in the 2019-2023 reporting year. Accordingly, the final sample consisted of nine companies, with a research duration of five years, yielding a research analysis unit of 45 observation units. Table 1 shows a list of samples' companies.

TABLE 1: Companies Data.

No.	Code	Company's Name
	DVLA	Darya-Varia Laboratoria Tbk.
	KLBF	Kalbe Farma Tbk.
	MEREK	Merck Tbk.
	MIKA	Mitra Keluarga Karyasehat Tbk.
	SIDO	Industri Jamu dan Farmasi Sido
	PRDA	Prodia Widyahusada Tbk.
	PEHA	Phapros Tbk.
	TSPC	Tempo Scan Pacific Tbk.
	SCPI	Organon Pharma Indonesia Tbk.

The data that has been collected is considered secondary data, and it is accessible, concluded the IDX website. (www.idx.co.id). The choice of this location for the research study was driven by a multifaceted set of criteria and considerations that the IDX has provided valid and reliable secondary data because the published financial statements have been audited by the company's external auditors so that they can be accounted for.

3.2. Model development

The figure below is a model of the hypothesis developed from the theory and previous research described earlier.

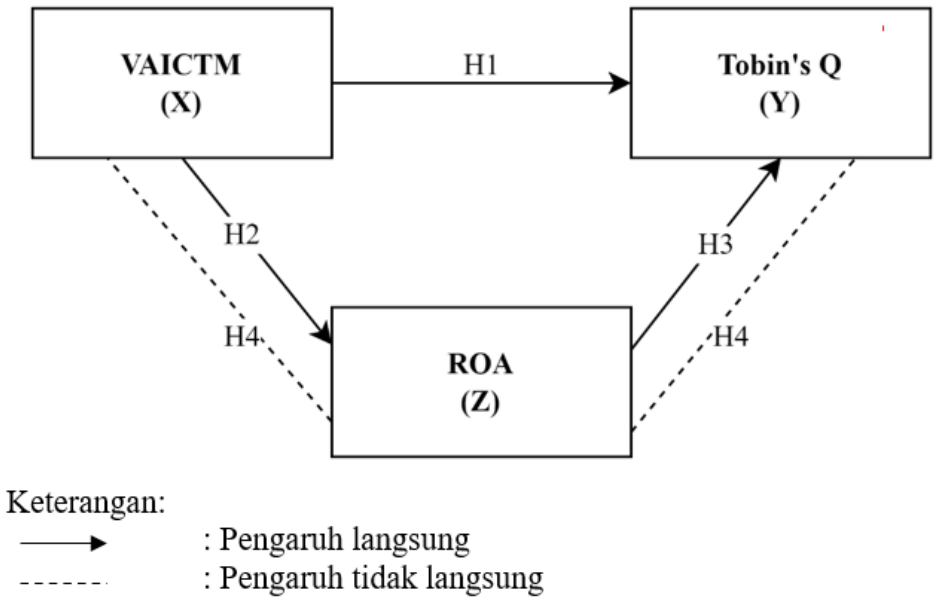

Figure 1: Path analysis model.

Table 2 provides the operational definitions of the study's variables, including their concepts, definitions, indicators, and measurement scales.

3.3. Data Analysis

This research utilized two types of data analysis: descriptive and inferential statistics. The first analysis was employed to summarize and explain the observed conditions during the study. Meanwhile, inferential statistical analysis was used to evaluate sample data and generalize the findings to the broader population. The study utilized parametric inferential statistics to examine population parameters through sample data, which

TABLE 2: Operational Definition of variables.

Concept	Variable	Variable Definition	Indicator	Scale of Measurement
IC	Value Added Intellectual Coefficient (VAIC™)	VAIC™ is an assessment tool constructed to evaluate the extent to which a company's intellectual capabilities contribute to value creation. VAIC™ enables the demonstration of the efficient utilization of both resources—namely, physical capital and intellectual potential—by the company in question.	$VAIC^{TM} = VAHU + STVA + VACA$ [3]	Ratio
Firm Value	Tobin's Q	Tobin's Q is a ratio used to assess the market value of a company and reflects the status of its key fundamentals, such as its asset base.	$\frac{ME+DEBT}{Total\ Assets}$ [30]	Ratio
Profitability	ROA	ROA is a measure used to assess the profitability of an investment relative to the total assets utilized. An increase in assets within a company, irrespective of other variables, is indicative of this metric. This ratio is indicative of the extent to which equity contributes to the generation of net income.	$\frac{net\ income}{total\ assets} x\ 100\%$ [15]	Ratio

required the data to follow a normal distribution. The parametric statistical method applied in this study was path analysis, consisting of several steps: (1) Performing classical assumption tests, including normality, multicollinearity, autocorrelation, and heteroscedasticity tests, (2) Evaluating the path construct to determine its empirical testability, (3) Calculating direct and indirect effects, (4) Performing the Sobel Test to evaluate the significance of the mediating effect, as determined by the product of the coefficients. The contribution of the path analysis was determined by the path coefficient in each causal relationship diagram between variables X and Y and their effect on Z [28].

4. Results and Discussion

4.1. Descriptive Statistical Analysis

Table 3 presents for the companies included in the research sample.

Overall, the average value of IC during the 2019-2023 period was at a positive level. This data indicates that during this period there has been an improvement in

Table 3: Descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
VAICTM	45	1.4121	8.2460	2.815069	1.1634587
TOBINS Q	45	.2838	6.9621	2.607960	2.0051841
ROA	45	.0034	.3099	.123738	.0674954
Valid N (listwise)	45				

the processing of company resources and assets. This development also suggests that IC has the potential to create additional value or profit for the company. Tobin's Q, an indicator of market efficiency, varies from a low of 0.2838 to a high of 6.9621, with the mean value of Tobin's Q is 2.607960, which signifies a Q value greater than 1, suggesting that the company's management is adept at managing assets or has overvalued assets. ROA's range is 0.0034 to 0.3099, with a mean of 0.123738 (12.37%). This means the company can profit 12.37% from assets invested.

4.2. Inferential Statistical Analysis

The initial step in conducting path analysis entails the determination of the regression equation and its R Square coefficient. This study has 2 (two) structural models which will be explained below. Figure 2 shows structural model 1 which shows the connection between IC proxied by VAIC^{TM} and profitability proxied by ROA (Table 4).

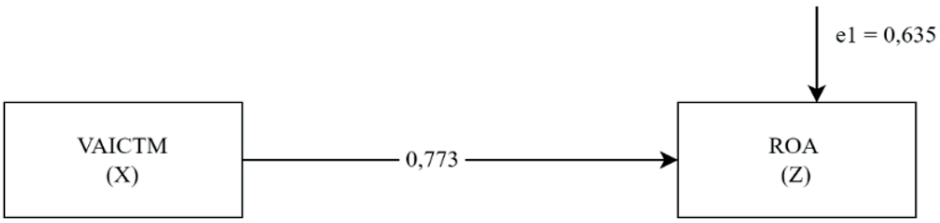

Figure 2: Substructural 1.

Table 4: The result of R Square substructural 1 VAIC^{TM} to ROA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773[a]	.597	.587	.0433504

a. Predictors: (Constant), VAICTM

b. Dependent Variabel: ROA

The regression test equation formed based on path analysis model I is as follows:

ROA = 0.773 X + 0.635*

The regression coefficient (β) for the VAIC^{TM} variable is positive, with a value of 0.773, indicating that a one-unit rise in VAIC^{TM} will result in a corresponding increase in ROA by 0.773, under the assumption that the values of the other independent variables remain constant.

The *error (e1) value can be found by the formula $e1 = \sqrt{1 - R\ Square}$.

$$e1 = \sqrt{1 - 0,597} = 0,6348$$

Table 5 indicates that the adjusted R-squared value of the VAIC^{TM} model on ROA is 0.587, which corresponds to 58.7% of the variability in the data. This indicates that VAIC^{TM} variable, exerts a significant influence on the company's profitability, as measured by the ROA variable. The remaining 41.3% of the factors influencing profitability are due to elements not covered in this study. Furthermore, **the direct effect** of VAIC^{TM} on profitability (ROA) is 0.773 (Table 6).

TABLE 5: Substructural results of R Square VAICTM on Tobin's Q.

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.590[a]	.348	.333	1.6372935

a. Predictors: (Constant), VAICTM

b. Dependent Variabel: TOBINS Q

The direct effect of (VAIC^{TM}) on firm value (Tobin's Q) is 0.590.

TABLE 6: Substructural results of R Square ROA on Tobin's Q.

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693[a]	.480	.468	1.4626633

a. Predictors: (Constant), ROA

b. Dependent Variabel: TOBINS Q

The direct effect of ROA on firm value is significant, with a calculated value of 0.693.

The explanation of model 2 above starts from the multiple regression results as illustrated in the subsequent table:

Based on the path analysis model II, the resulting regression test equation is:

Tobin's Q = 0.136 X + 0.587 Z + 0.715*

The equation of model II based on table above is interpreted as follows:

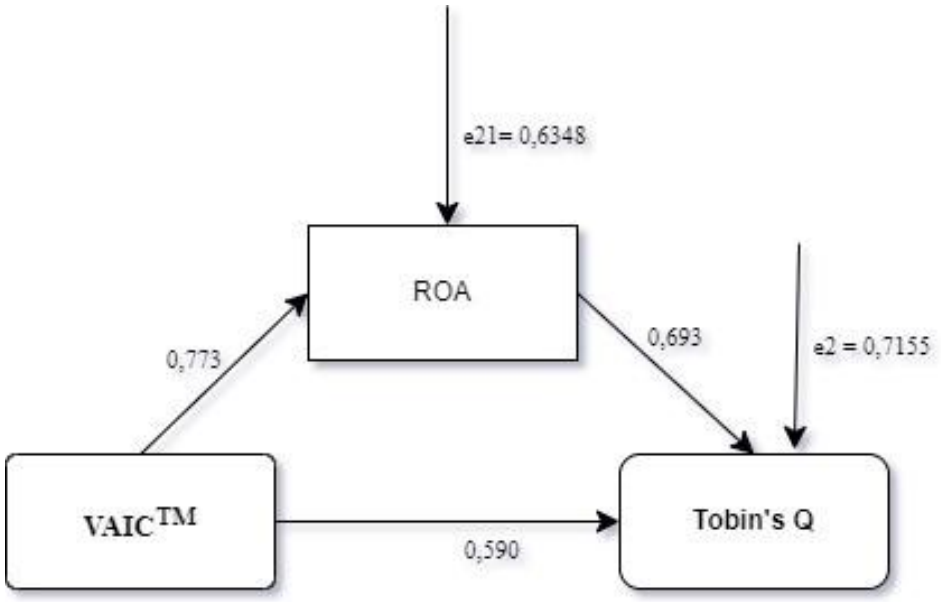

Figure 3: Substructural 2.

It is evident that the regression coefficient for the VAIC™ variable is positive at 0.136, indicating that a 1-unit increase in VAIC™ will lead to a 0.136 increase in Tobin's Q. This conclusion assumes that all other independent variables remain unchanged. Constant.

Moreover, it is discernible that the regression coefficient value of the ROA variable is positive, namely 0.587. This implies that an increase in ROA by 1 will lead to an augmentation in Tobin's Q by 0.587. This conclusion is reached under the supposition that the remaining independent variables remain constant.

The *error ($e2$) value can be calculated using the formula $e2 = \sqrt{1 - R\ Square}$

$$e2 = \sqrt{1 - 0,488} = 0,7155.$$

Table 7: Results of R Square substructural 2 VAIC™ and ROA on Tobin's Q.

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698[a]	.488	.463	1.4692470

a. Predictors: (Constant), ROA, VAIC™

b. Dependent Variabel: TOBINS Q

Table 7 illustrates the adjusted R-squared value of 0.463 (46.3%), representing that VAIC™ and ROA influence Tobin's Q by 46.3%. The rest of the variance in firm value is due to factors not covered in this study.

Indirect Influence Analysis. To calculate the indirect effect, the formula for the influence of the VAIC^{TM} variable on Tobin's Q (X → Z) x (Z → Y) was used, resulting in 0,535 or (X → Z) x (Z → Y): 0,773 x 0,693= 0,535. The calculation above demonstrates that the direct effect value (VAIC^{TM}) on Tobin's Q is 0.590, and the indirect effect is 0.535. This indicates that the direct effect value is greater than the indirect effect value (0.590 > 0.533).

Total Impact. The effect of the VAIC^{TM} variable on Tobin's Q through the ROA variable (X →Z) + (Z → Y): 0,773 + 0,693= 1,466

The Sobel test is a statistical analysis used to determine the significance of the mediation relationship through a moderator variable (Figure 4) [31].

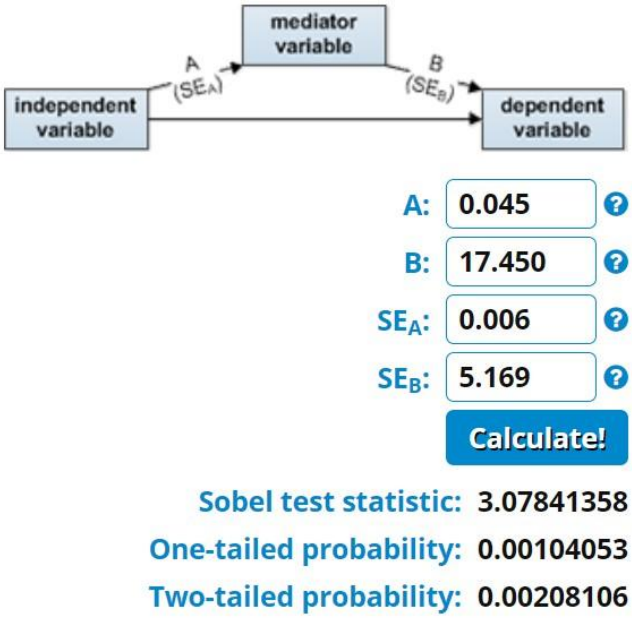

Figure 4: Sobel Test Statistics.

The Sobel test reveals a two-tailed probability is 0.002, which is below the 0.05 threshold. This indicates that profitability significantly mediates the relationship between IC and firm value. Nonetheless, the T-test results indicate that the direct effect of IC (X) on firm value (Y) shows a significance level of 0.437, which exceeds the threshold of 0.05. This suggests that although IC positively influences firm value, the effect is not statistically significant, leading to the rejection of the hypothesis that "intellectual capital affects firm value."

The determination test shows that intellectual capital accounts for 33.3% of Tobin's Q, while the other 66.7% is influenced by factors outside the scope of this study. These findings are consistent with Subaida et al. (2018), who also found an insignificant

relationship between VAIC^{TM} and firm value. [32]. Nevertheless, these findings align with the research by Appah et al. (2023) and Chen (2005), which indicate that structural capital has the most substantial positive impact on a company's financial performance, productivity, and firm value, surpassing the effects of physical and human capital [9,25]. Structural capital encompasses the systems, processes, technologies, and organizational structures that enable the company to function efficiently and innovatively. A strong infrastructure allows for the optimization of resources, enhancing productivity and operational effectiveness. For instance, advanced IT systems, intellectual property, and well-established routines help businesses scale more effectively, contributing directly to improved financial performance [8,33]

Analyzing the second hypothesis (H2) on the influence of IC on ROA shows a significance value lower than 0.05 (0.000 < 0.05). This result indicates that the IC (X) has a significant positive impact on profitability (Z), confirming the second hypothesis that "intellectual capital influences profitability". These findings align with previous research handled by Margareta & Prasetyo (2020), Ozkan et al. (2017), and Kazhimy & Sulasmiyati, which also affirm the significant relationship between IC and profitability [19,23,24]. Several studies show that IC and profitability have a close relationship with a positive contribution. IC—covering human, structural, and relational capital—plays a pivotal role in creating value for organizations. When companies effectively manage and leverage IC, they can innovate, improve efficiency, and differentiate themselves from competitors, all of which contribute to higher profitability. Rendering to Edvinsson and Malone (1997), IC enables firms to create a sustainable competitive advantage, which leads to increased profits [33].

The findings from testing the third hypothesis (H3), which the analysis reveals that the impact of profitability on firm value is substantial, with a p-value of 0.002, indicating statistical significance below the 0.05 threshold. This indicates that profitability positively and significantly influences firm value, confirming the third hypothesis: "profitability affects firm value." The determination test indicates that profitability accounts for 46.8% of the changes in firm value, while the other 53.2% is influenced by factors not included in this study. These results align with the research of Khalifaturofi'ah & Setiawan (2024) and Appah et al. (2023), which demonstrate that profitability significantly influences firm value [9,27]. This study aligns with the principles of signaling theory, which suggests that the quality of information about profits generated from assets provided by management can serve as a reference point for investment decisions aimed at enhancing firm value. Enhanced profitability significantly boosts firm value by elevating

the company's perceived worth among investors, often signals strong financial health and operational effectiveness, making the company more appealing to investors. A profitable business can generate consistent cash flows, supporting growth, dividends, and reinvestment, which in turn raises the company's market value. Investors are inclined to prefer firms with greater profitability because it reduces perceived risk and showcases the company's capability to produce returns. In conclusion, if ROA has a positive and significant impact, it suggests that effective management of ROA enhances stock prices and overall company value. As ROA demonstrates a company's proficiency in converting its assets into net income, a high ROA signifies effective asset use, which is crucial for increasing firm value.

To assess the fourth hypothesis, this study's calculations show that the direct effect (0.590) exceeds the indirect effect (0.535). The Sobel test was utilized to assess the importance of IC's indirect effect on firm value. With a significance level of 0.002, which is below the 0.05 threshold, the results confirm that profitability acts as a mediator in the relationship between IC and firm value. These findings support the fourth hypothesis, which proposes that "intellectual capital affects firm value through profitability." This study aligns with the results of Margareta and Prasetyo (2020), who discovered that profitability acts as a mediator for the impact of IC on firm value [23]. An improvement in ROA, driven by increased IC, positively impacts financial performance, earning favorable recognition from investors and raising stock prices. Similarly, Appah et al. (2023) found that added value suggests a company has optimized its asset usage to achieve greater profitability [9]. Profitability, as a mediating variable, helps explain how IC influences firm value. IC can improve processes and decision-making, leading to increased efficiency and profitability. This profitability then impacts firm value, especially when the market perceives the company as capable of sustaining strong financial performance over time [34].

5. Conclusion

The findings of this study align with RBT, showing that IC qualifies as a distinctive resource that enhance a company's value and strengthens its competitive advantage. The more efficiently a company leverages its IC, the more it can boost income, reach long-term goals, strengthen relationships with investors, and enhance stakeholder trust, ultimately increasing the company's value.

Stakeholder theory also supports these results, suggesting that stakeholders take a vested interest in persuading management to optimize the utilization of organizational resources. Effective management of these resources leads to higher returns, improving stakeholder welfare. Transparency in financial performance boosts trust among stakeholders and shareholders, guiding their capital investment decisions. This trust is reflected in positive investor responses, as seen in rising stock prices and increased company value.

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