

Exploring the relationship between intellectual capital and firm value: Evidence from the Indonesian banking sector

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ABSTRACT

Intellectual capital has become a critical driver of firm value in the global shift toward a knowledge-based economy. Extensive research has explored intellectual capital, but most have used short periods, focused on broad industries, or combined all components into a single measure. Thus, to fill those gaps, this study empirically examines the relationship between intellectual capital components and firm value in the Indonesian banking sector. This study used proxies of human, innovation, customer, and process capital to offer insights into how intangible assets influence performance. Using multiple linear regression techniques, the analysis was based on panel data from banks listed on the Indonesia Stock Exchange from 2001-2022. The results revealed that innovation and customer capital are significantly associated with firm value, which aligns with resource-based theory. Only the capital adequacy ratio (CAR) significantly affects control variables. Innovation and customer capital are vital to firm value, while human and process capital are not. This finding highlights the need for bank managers and investors to prioritize intangible assets, especially innovation and customer relationships when evaluating and enhancing firm value.

Keywords: Intellectual Capital; Innovation Capital;
Customer Capital; Process Capital; Firm
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Introduction

Enhancing firm value is critical for firms since it impacts the well-being of investors and stakeholders (Khan et al., 2020; Pangestuti et al., 2022; Robiyanto et al., 2021). A firm's value can reflect its worth or equity in the company by measuring assets, stock prices, or discounted cash flows (Pangestuti et al., 2022). It also indicates the performance of the business (Ni et al., 2020). To showcase operational efficiency, firms must develop strategies to improve the firm value as investors tend to interpret the firm value as an indicator of business health, thereby encouraging investment (Pangestuti et al., 2022). The central concept behind firm value is the creation of value. Firms must optimally allocate resources to create value (Mohammed & Ani, 2020). A company demonstrates efficient capital use when it can convert resources into profits (Soewarno & Tjahjadi, 2020). In today's economy, intangible resources have taken center stage in wealth creation (Odat & Bsoul, 2022). Recent data indicates that the proportion of intangible assets held by the S&P 500 has risen, standing at approximately 90% in 2020 (Oceantomo, 2020). This trend highlights that major corporations, especially in the United States, now place greater importance on intangible assets, playing a crucial role alongside tangible assets in driving company growth and long-term success (Fu et al., 2022).

Intangible assets are non-physical benefits contributing to a company's future cash flows (Edvinsson & Sullivan, 1996). Although intangible assets lack a physical form, they can help a company achieve future profits. Robiyanto et al. (2021) argue that intangible assets enhance a company's competitive advantage because they possess unique characteristics that make them difficult for competitors to imitate. One type of these assets is intellectual capital. This includes intangible assets such as knowledge, skills, experience, trademarks, copyrights, patents, customer influence, and unique business processes that create value (Ovechkin et al., 2020). Therefore, Edvinsson and Sullivan (1996) assert that intellectual capital represents the value derived from knowledge. Intellectual capital can create competitive advantages for companies in ways that enhance firm value because these assets are not easily obtainable or replicable by competitors (Bayraktaroglu et al., 2019; Soewarno & Tjahjadi, 2020). Levinson and Malone (1997) classify intellectual capital into human capital, innovation capital, customer capital, and process capital.

Resource-based theory asserts that a firm's long-term competitive advantage can be achieved if it possesses resources that are valuable, difficult to imitate, and rare (Barney, 1991). Intellectual capital inherently possesses valuable, difficult-to-imitate, and rare

characteristics as a component of intangible assets, making it a potential foundation for competitive advantage (Soewarno & Tjahjadi, 2020). Therefore, companies need to pay attention to this asset, as not only can tangible assets provide benefits, but intangible assets can also enhance company profits (Robiyanto et al., 2021). Anifowose et al. (2018) argue that intangible assets are a primary source of value creation in the modern economy. Hence, companies must focus on their intangible assets, especially intellectual capital, which can provide a competitive edge.

Previous research has explored the connection between intellectual capital and firm value in multiple settings. Ovechkin et al. (2020) studied 25 companies listed on the MOEX Index during 2014–2015. They found that a company's market value and intellectual capital had a strong positive relationship, using modified residual income, modified economic value, and equity value added as measurement approaches. Similarly, Robiyanto et al. (2021) conducted a study in Indonesia involving companies from the SRI-Kehati Index over the 2013–2017 period, concluding that intellectual capital positively influences firm value. Their study used the value-added intellectual coefficient (VAIC) method to assess intellectual capital. Contrarily, Odat and Bsoul (2022) reported no significant association between intellectual capital and firm value. Their study, which targeted manufacturing and service firms listed on the Amman Stock Exchange between 2014 and 2018, also used the VAIC method. It is important to mention that whereas Ovechkin et al. (2020) and Robiyanto et al. (2021) treated intellectual capital as a unitary construct, Odat and Bsoul (2022) examined it as both an aggregate and components—in human capital, structural capital, and capital employed—illustrating the necessity of disaggregating some components of intellectual capital to understand their influence on firm value better.

The research aims to empirically examine the relationship between the components of intellectual capital and firm value. This study uses a sample of banking companies listed on the Indonesia Stock Exchange (IDX). Banking companies were selected as they are considered knowledge-intensive firms, utilizing intellectual property and innovative ideas generated by their workforce to develop products, services, or solutions that can be sold in the market (Edvinson & Malone, 1997). Indonesia was chosen as the research location due to the limited number of studies on intellectual capital in developing countries (Al-Khoury et al., 2022). Data for the study were collected from 2001 to 2022, with an extended data collection period to ensure that the data used are truly representative. This study measures intellectual capital variables based on the research by Ni et al. (2020) and also examines the components of intellectual capital separately, namely human capital, innovation capital,

customer capital, and process capital. Based on previous research, several variables are consistently believed to influence firm value, namely non-performing loans (NPL), capital adequacy ratio (CAR), efficiency ratio (ER), earnings per share (EPS), and firm size. This study uses these variables as control variables to mitigate potential bias in the influence between variables.

Literature Review

Resource-Based Theory

Resource-based theory remains one of the key approaches in strategy management as it offers a systematic way to determine what essential building blocks a firm needs to gain and maintain a competitive edge (Utami & Alamanos, 2023). It explains why some firms can outperform others and help explain and predict the foundations of firm performance (Helfat & Peteraf, 2003). This theory is based on two primary assumptions. First, any given firm is considered to have distinct resources that differ from other firms, referred to as resource heterogeneity. This difference means that firms can execute certain activities better and construct substantial competitive advantages that are not easy to replicate, substitute, or find elsewhere (Bayraktaroglu et al., 2019; Helfat & Peteraf, 2003). The second assumption, “immobility,” suggests that these valuable resources cannot be easily traded or transferred between firms, meaning that resource differences can persist over time and contribute to long-term competitive advantage (Utami & Alamanos, 2023).

Value, rarity, imperfect imitability, and non-substitutability are the conditions used to determine if a resource can create and sustain a competitive advantage (Barney, 1991). Often referred to as the VRIS framework, these criteria assist firms in recognizing strategic resources that contribute to enduring success. A resource must be valuable first, meaning it must aid a firm in exploiting opportunities or mitigating environmental threats. A distinctive competitive advantage production formula serves as an exemplifying value. Secondly, the resource must be rare; it should not be easily acquired from current or potential competitors. An example is a global distribution network that only a handful of firms possess. Thirdly, it has to be difficult to imitate; valuable and rare resources must not be easily acquired or duplicated by other firms. A globally recognized brand demonstrates this concept powerfully. Lastly, the resource has to be non-substitutable; alternative resources that offer comparable advantages cannot support the firm's operations. Collectively, these conditions help a firm sharpen its resources to enhance significantly its competitive advantage, ensuring these resources actively contribute to a robust and enduring competitive edge.

In Resource-Based Theory, resources refer to assets, business processes, capabilities, company attributes, knowledge, information, etc., that the company controls to understand and implement strategies aimed at improving efficiency and effectiveness (Barney, 1991). Resources in this theory can be categorized into tangible and intangible assets (Barney, 1991; Molloy et al., 2011). Tangible assets include visible economic benefits and business contributions, such as products and commodities (Lyons & Brennan, 2019). In contrast, intangible assets are non-physical benefits contributing to future cash flows. These benefits have been acquired or possessed by an entity that controls access to them (Edvinsson & Sullivan, 1996).

Research by Anifowose et al. (2018) indicates that intangible assets are a primary source of value creation in the modern economy. This means that intangible assets play a crucial role in creating value for companies in the modern economy. One part of these intangible assets is intellectual capital. Intellectual capital has four characteristics necessary to provide a long-term competitive advantage for a company (Bayraktaroglu et al., 2019; Soewarno & Tjahjadi, 2020). Proper and optimal intellectual capital management can be a key factor for companies to enhance their competitive advantage and increase their value.

Firm Value

The firm value measures a company's quantitative reputation, which is the company's intrinsic worth or a fair market price. It is essential because it reflects the firm's overall achievement and reputation as an investor perceives its investment yield (Ni et al., 2020). It is also one of the most important indicators to assess the firm's growth (Ni et al., 2020). The core concept of firm value is basic and straightforward. The concept is value creation, which indicates that a firm has to create additional value through the application of its resources efficiently and effectively (Mohammed & Ani, 2020). One of the most commonly used indicators for measuring firm value is Tobin's Q, which is defined as the ratio of the market value of equity to the company's book value (Robiyanto et al., 2021). Good firm value reflects efficiency and effectiveness in the capital spent (Soewarno & Tjahjadi, 2020). Competitive advantage is an area that can add tremendous value to a firm if it is managed optimally or even properly (Pangestuti et al., 2022). Intellectual capital plays a significant role in this context, as its unique characteristics make it a strategic asset that can strengthen a company's competitive position. Effective intellectual capital management has increased firm value (Ovechkin et al., 2020; Robiyanto et al., 2021).

Firm value refers to a measure that reflects a company's intrinsic value or fair price. It is considered a crucial determinant of a company's success as it reflects its performance, influencing how investors perceive the company as an investment opportunity (Ni et al., 2020). Firm value is a key benchmark for assessing a company's performance (Ni et al., 2020). The central concept of firm value is value creation, meaning a company must add value by utilizing its resources effectively (Mohammed & Ani, 2020). Firm value can be measured using Tobin's Q, which is calculated by dividing the market value of equity by the company's book value (Robiyanto et al., 2021).

One indicator of good firm value is the efficient and effective use of capital (Soewarno & Tjahjadi, 2020). Managing company resources and how effectively they are utilized to create a sustainable competitive advantage will maximize the added value to the company (Pangestuti et al., 2022). The characteristics of intellectual capital make it an asset that can enhance a company's competitive edge. Effective intellectual capital management will increase the firm's value (Ovechkin et al., 2020; Robiyanto et al., 2021).

Intellectual Capital

Edvinsson and Sullivan (1996) define intellectual capital as knowledge that can be converted into value. Knowledge, skills, and innovation hold significant economic value for a company. When effectively utilized, this knowledge can create a competitive advantage that impacts the company's performance and value (Putra & Ratnadi, 2021). Therefore, by managing knowledge and intellectual resources effectively, a company can enhance its value and competitiveness in the market.

Intellectual capital includes intangible assets such as knowledge, skills, experience, trademarks, copyrights, patents, customer influence, and unique business processes that create value (Ovechkin et al., 2020; Dwimayanti et al., 2023). This indicates that intellectual capital consists of knowledge, experience, company technology, and relationships with customers, suppliers, and others, which can create competitive advantages in the market (Ranani & Bijani, 2014). Intellectual capital is crucial in gaining a competitive advantage and improving performance (Soewarno & Tjahjadi, 2020). This asset can also enhance shareholder value creation through innovation (Patthirasinsiri & Wiboonrat, 2017). Intellectual capital can be classified into human capital, innovation capital, customer capital, and process capital (Edvinson & Malone, 1997).

The most important asset in a company is human resources, which comprises a combination of intelligence, skills, knowledge, talent, and expertise (Odat & Bsoul, 2022;

Sisodia et al., 2021). Human capital includes employees' experience, abilities, knowledge, commitment, and motivation (Chen & Zhu, 2004; Edvinson & Malone, 1997). Human resources also contribute significantly to the production process and generate profits for the company, enhancing its performance. Optimal human resource management can help maximize company performance (Hatane et al., 2020; Pardiman, 2018).

As a component of intellectual capital, innovation is creating and implementing new ideas, products, services, or processes that bring positive changes and add value (Edvinson & Malone, 1997). Innovation capital drives the company to create new things and achieve competitive advantage and sustainable growth (Chen & Zhu, 2004; Tseng et al., 2015; Woiceshyn & Eriksson, 2014). The Value Creation Index has identified innovation as a key factor driving firm value (Cuganesan, 2005).

On the other hand, customer capital is an important asset for the company (Morlacco & Zeke, 2021). Customer capital refers to the value embedded in the way a company communicates and interacts with customers through marketing channels and conducting its business (Chen & Zhu, 2004). This means that how a company interacts with and nurtures relationships with its customers is a crucial value embedded in the overall firm value.

Finally, process capital refers to the company's methods, governance, and procedures to enhance productivity and quality (Scafarto et al., 2016). As an intangible asset, process capital represents the knowledge and skills required to perform organizational tasks effectively and efficiently (Matthies, 2014). A company's performance can be observed through well-organized and efficient business processes, positively impacting firm value.

Intellectual Capital and Firm Value

Resource-based theory suggests that rare, valuable, and hard-to-imitate assets are the primary sources of long-term competitive advantage. One of the most critical and rare assets a company can have is human capital, along with its unique abilities, as each individual brings different skills and characteristics. Companies with high-quality human resources receive better market evaluations (Sisodia et al., 2021). The knowledge, experience, and strong human capital capabilities can improve company performance and boost firm value by increasing productivity and service quality. Several studies, including those by Sisodia et al. (2021), Odat and Bsoul (2022), and Ni et al. (2020), have shown that firm value is positively influenced by human capital, supporting the development of the following hypothesis.

H₁: Human capital has a positive relationship with firm value.

Bayraktaroglu et al. (2019) found that innovation capital directly impacts company productivity. Productivity is the company's ability to use available assets to efficiently and effectively produce goods or services. Increased productivity enhances the company's operational performance, leading to higher revenue growth and profitability.

H₂: Innovation capital has a positive relationship with firm value.

A company's customer base is one of the most important elements (Morlacco & Zeke, 2021). Firm reputation, customer capital, and customer satisfaction become vital because customers provide revenue, determine a company's success, and help achieve goals in the long run (Ni et al., 2020). Moreover, customer capital usually improves firm value by increasing revenue from customer retention and market share and strengthening sustainable growth. Relationships and customer satisfaction are the two significant areas where a firm can invest and improve to achieve its competitive edge and value. Customer capital, as described by Ertugrul et al. (2023) and Lehenchuk and Zavalii (2021), significantly boosts firm value, which leads to the formulation of the following hypothesis.

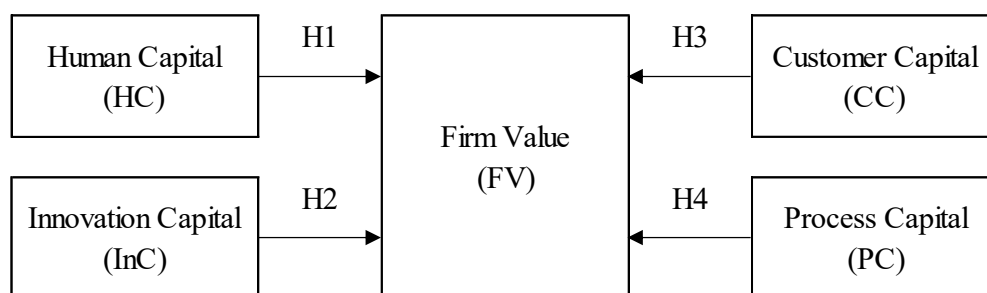
H₃: Customer capital has a positive relationship with firm value.

According to resource-based theory, firms must optimize assets to gain a competitive edge. Further, these resources must be appropriately managed within predefined systems and frameworks. The practical and efficient allocation of resources is closely related to process capital, which is defined as the knowledge and competencies of an organization that is embedded in its systems, processes, and practices and thus constitutes part of the organizational culture (Matthies, 2014). Process capital stream enables the organization to achieve operational efficiency through its infrastructure, including processes, systems, and resources. By effectively managing business processes, an organization can achieve enhanced productivity by using fewer resources, which improves overall performance and firm value. Supporting this view, Ni et al. (2020) found that process capital positively impacts firm value, leading us to propose the following hypothesis.

H₄: Process capital has a positive relationship with firm value.

To summarize, Figure 1 illustrates the conceptual framework of this study, which examines the relationship between different components of intellectual capital and firm value. The framework consists of four main hypotheses. H₁ proposes that human capital (HC), which refers to employees' knowledge, skills, and abilities, positively influences firm value (FV). H₂ suggests that innovation capital (InC), representing a firm's capacity to develop and

Figure 1. Research Framework



implement new ideas, which has a positive effect on firm value. H₃ posits that customer capital (CC), which focuses on the value of customer relationships and loyalty, contributes positively to firm value. Finally, H₄ indicates that process capital (PC), reflecting the effectiveness and efficiency of organizational processes, positively affects firm value. This model is based on resource-based theory, which emphasizes that valuable, rare, and difficult-to-imitate resources can enhance a firm's competitive advantage and performance.

Methods

The population of this study comprised banking sector companies listed on the Indonesia Stock Exchange (IDX), totaling 47 companies. This research employed a nonprobability sampling technique, specifically saturation sampling, as the sample selection method. Therefore, the sample size used in this study was equal to the population size of 47 banking sub-sector financial companies. The data for this study spans from 2001 to 2022. However, at the beginning of the observation period, some companies had not yet conducted their initial public offering (IPO), resulting in missing data for those companies. Consequently, these companies were excluded from the analysis. The final dataset used in this study consisted of 696 observations. The data was sourced from the Eikon Refinitiv database.

Three variables were used: independent, dependent, and control variables. In addition, the proxies used to measure the variables are presented in Table 1 above. Furthermore, the data obtained were analyzed using multiple linear regression analysis and tested using descriptive statistics to explain the characteristics of the data, multicollinearity tests to examine whether there is a correlation between the independent variables in the regression model, and correlation tests to determine whether there is a linear relationship between two variables and the strength of that relationship. The data analysis tool used was STATA 17. The regression model used can be seen in model equation 1.

Table 1. Variables

Variables		Proxies
Dependent Variable (Ni et al., 2020)	Firm Value (FV)	The market value of assets over the book value of assets
Independent Variables (Ni et al., 2020)	Human Capital (HC)	Total revenue over the number of employees
	Innovation Capital (IC)	Total intangible assets divided by total assets
	Customer Capital (CC)	The growth rate of total revenue
	Process Capital (PC)	Total sales over total current assets
Control Variables (Ni et al., 2020)	Non-Performing Loans (NPL)	The ratio of non-performing loans to total loans
	Capital Adequacy Ratio (CAR)	The ratio of a bank's capital to its risk-weighted assets
	Efficiency Ratio (ER)	Operating expenses divided by operating revenue
	Earning per share (EPS)	Net income divided by the number of outstanding shares
	Firm Size (UP)	Ln (market capitalization)

$$FV = \alpha + \beta_1 HC + \beta_2 IC + \beta_3 CC + \beta_4 PC + \beta_5 NPL + \beta_6 CAR + \beta_7 ER + \beta_8 EPS + \beta_9 UP + \varepsilon \quad (1)$$

Where:

FV = Firm Value

α = Constant

$\beta_1 - \beta_9$ = Regression Coefficient

HC = Human Capital

IC = Innovation Capital

CC = Customer Capital

PC = Process Capital

NPL = Non-Performing Loan

CAR = Capital Adequacy Ratio

ER = Efficiency Ratio

EPS = Earning-Per Share

UP = Firm Size

ε = Error

Descriptive statistical tests are intended to describe the data collected through description without the aim of concluding (Sugiyono, 2019, p. 206). The results of descriptive statistics displaying the number of observations, average, standard deviation, minimum, and maximum can be seen in Table 2. The variable for company value in this study has a minimum value of 0.042. The maximum value for this variable is 3.473. The average value is 0.402, which is less than one, indicating that banking companies listed on the IDX during the observation period are valued lower by the market than their book value. Human capital has a minimum value of 0.000 and a maximum value of 25,229.110. The average value is IDR 953.291, indicating that, on average, each employee in these companies generates operational revenue of IDR 953,291,000 per year. Innovation Capital (Inc) has a minimum value of 0.000 and a maximum value of 0.068. The average value of 0.002 indicates that, on average, banking companies have intangible assets comprising 0.2% of their total assets. Customer Capital has a minimum value of -1.053 and a maximum value of 4.835. The average value of 0.230 indicates that the average total revenue growth of these banking companies is 23%. This means that, on average, the revenue of banking companies listed on the Indonesia Stock Exchange grew by 23% from the previous year. Lastly, Process Capital has a minimum value of -5.767 and a maximum value of 74.332. The average value of 4.019 indicates that, on average, banking companies listed on the Indonesia Stock Exchange have a current asset turnover of 4.019 times.

Table 2. Descriptive Statistical Results

Variables	Observation	Mean	Std. Deviation	Min	Max
FV	696	0.402	0.514	0.042	3.473
HC	696	953.291	2,929.672	0.000	25,229.110
InC	696	0.002	0.009	0.000	0.068
CC	696	0.230	0.662	-1.053	4.835
PC	696	4.019	12.485	-5.767	74.332
NPL	696	0.024	0.041	0.000	0.279
CAR	696	0.222	0.182	0.000	1.274
ER	696	0.671	0.684	0.000	5.090
EPS	696	65.060	120.628	-310.932	589.929
UP (Billion Rupiah)	696	116	240	774.779.1	1.42

Table 3. Correlation Statistical Analysis

	FV	HC	InC	CC	PC	NPL	CAR	ER	EPS	UP
FV	1.000									
HC	-0.004	1.000								
InC	0.191*	-0.034	1.000							
CC	0.164*	-0.017	0.074	1.000						
PC	-0.028	-0.006	-0,046	0,011	1.000					
NPL	0.162*	-0.006	0.078*	-0,085*	0.035	1.000				
CAR	0.610*	0.023	0.195*	0,072	-0.052	0.231*	1.000			
ER	0.057	-0.091*	-0.008	-0.094*	-0.124	0.071	0.052	1.000		
EPS	-0.015	0.160*	-0.005	-0.027	0.283*	-0.049	-0.050	-0.204*	1.000	
UP	-0.027	0.179*	-0.053	-0.060	0.481*	0.055	-0.052	-0.149	0.533	1.000

Table 4. Results of Multicollinearity Test

	HC	InC	CC	PC	NPL	CAR	ER	EPS	UP
VIF	1.06	1.05	1.04	1.33	1.09	1.11	1.07	1.45	1.73

Table 3 presents the correlation test results, where asterisks (*) indicate significant correlations between variables. Although some variables show significant correlations, this does not pose a problem for the analysis because, as shown in the multicollinearity test results in Table 4, there is no indication of multicollinearity in this study's regression model. A regression model is generally considered free from multicollinearity issues if the variance inflation factor (VIF) values are less than 5 (Hair et al., 2019). Table 4 shows that all variables have VIF values below 5, confirming that no multicollinearity exists and that the independent variables do not have problematic intercorrelations in this model. Furthermore, Table 5 provides the results of the multiple linear regression analysis used to examine the influence of intellectual capital components on firm value.

Furthermore, this study uses a large sample size from 2001 to 2022. For large samples, the assumption of normality of residuals is less of a concern due to the Central Limit Theorem, which states that the distribution of estimators approaches normality as the sample size increases (Knief & Forstmeier, 2021). Therefore, although normality assessments are often reported, this is not a strict requirement that must be met in the case of large samples.

Furthermore, this study utilizes Stata software that analyzes heteroscedasticity using the robust option in regression analysis, which utilizes standard errors consistent with heteroscedasticity. An explicit test for heteroscedasticity is less crucial in implementing robust standard errors because robust standard errors adjust for consistency, even when such conditions exist (Hayes & Cai, 2007). Therefore, a large sample size combined with sophisticated estimation techniques strengthens the study's findings despite the strict assumptions of normality and homoscedasticity.

Result and Discussion

Table 5 shows that the human capital (HC) regression coefficient is -0.000 with a p-value of 0.637. This means that Hypothesis 1 (H_1) is rejected. This result indicates that human capital does not have a relationship with the firm value of banking companies in Indonesia. The level of human capital does not relate to the firm value of banking companies in Indonesia. These findings contrast with those of Sisodia et al. (2021), who used a sample of non-financial companies in India; Odat and Bsoul (2022), who used a sample of manufacturing and service companies in Jordan; and Ni et al. (2020), who used data from companies listed on the Taiwan Stock Exchange (TWSE). Additionally, this result does not support the assumptions of resource-based theory, which posits that rare, valuable, and hard-to-imitate assets are sources of long-term competitive advantage. One such asset is human capital.

Human capital is a highly valuable asset for a country and a company (Sisodia et al., 2021). However, according to the World Economic Forum (2017), the quality of human resources in Indonesia ranks 65th out of 130 countries, below neighboring countries such as Malaysia (ranked 33rd) and Thailand (ranked 40th). Human resources income in Indonesia is also categorized as low-middle income, indicating the low quality of Indonesia's human resources (Linggardjaja & Isnalita, 2020). The low level of human capital in Indonesia may cause investors not to view human capital as a valuable asset when assessing companies (Smriti & Das, 2018). This factor can prevent human capital from influencing or reducing firm value. This study's results are consistent with those of Li and Zhao (2018) in China, Smriti and Das (2018) in India, and Vomberg et al. (2015), who used samples from manufacturing and service companies.

On the contrary, the variable Innovation Capital (InC) has different outcomes. Even though it accounts for a relatively small proportion when compared to total assets, in the case of banking companies listed on IDX, the regression analysis shows a positive and significant

Table 5. Hypothesis Testing Results

	Hypothesis	Coefficient	t-Value	Prob.	Decision
H ₁	HC -> FV	-0.000	-0.470	0.637	Rejected
H ₂	InC -> FV	3.984	2.200	0.028	Accepted
H ₃	CC -> FV	0.098	4.150	0.000	Accepted
H ₄	PC -> FV	-0.000	-0.130	0.895	Rejected

coefficient of 3.984 with a p-value of 0.028 in firm value supports Hypothesis 2 (H₂). The resource-based theory still corroborates these findings, whose impact lies in distinctive and productive resources that give a firm greater competitive advantage. I endorse findings from Hsiao (2014), who studying biotech firms in Taiwan; Ni et al. (2020), who studied firms listed on the Taiwan Stock Exchange (TWSE); and Kijek (2014), who worked with the EU Industrial R&D Investment Scoreboard data.

As noted by Hsiao in 2014, innovation is critical for maintaining a long-term competitive edge in the era of globalization and rapid technological advancements. Tseng et al. 2015 defined innovation capital as a firm's ability to develop and execute new ideas, products, processes, or technologies. With innovative products and services, businesses can attract new clients, thus increasing revenue (Ni et al., 2020). Further, innovation can enhance operational effectiveness, reduce costs, and strengthen profit margins (Bayraktaroglu et al., 2019). In today's dynamically changing market, companies that do not attempt to innovate will always be at risk of losing to continuously adaptive competitor

Customer capital also shows a positive relationship with firm value, as reflected by a regression coefficient of 0.098 and a p-value of 0.000, indicating that Hypothesis 3 (H₃) is supported. These findings are consistent with the studies of Ertugrul et al. (2023) and Lehenchuk and Zavalii (2021). As a key component of intellectual capital, customer capital has unique characteristics that are difficult for competitors to imitate, which aligns with the assumptions of resource-based theory. Customer capital is rooted in customers' positive perceptions of a company's products or services. It encourages them to remain loyal, make repeat purchases, buy larger quantities, and even pay premium prices (Ertugrul et al., 2023). This ultimately leads to higher revenue and increases firm value. Customer capital is especially crucial for service-based businesses like banks, which rely heavily on customer deposits to provide loans and generate income from interest. Without strong customer relationships, banks would lose their primary source of funds and profitability. Maintaining

good relationships ensures that customers continue using the bank's services, benefiting from convenience and financial advantages, which strengthens their loyalty and reduces the likelihood of switching to other banks (Howcroft et al., 2003). These findings are consistent with observations from banking sectors in other countries, such as Nigeria and Scandinavian nations (Tulcanaza-Prieto et al., 2022).

The final hypothesis of this study suggests that process capital positively impacts firm value. However, the analytical results of this study contradict this outcome. Thus, Hypothesis 4 (H₄) is dismissed—process capital (PC) has a regression coefficient of -0.000 with a *p*-value of 0.895 . This result contradicts Ni et al. (2020), who found a positive effect while studying Taiwan Stock Exchange (TWSE) firms. This study defines process capital as the current asset turnover ratio, which is the sales-to-total current assets ratio (Ni et al., 2020). Banking firms do not operate like typical firms because their primary business is collecting and distributing funds. Therefore, their current assets include highly liquid cash and receivables. This characteristic of liquidity may limit the current asset turnover ratio's capacity to accurately represent the banking sector's operational efficiency, which may be the reason for the non-significant relationship in this study.

Current banking assets often turn over quickly due to the bank's intensive activities in providing loans, making investments, and managing customer funds. This rapid turnover means that current assets do not revolve like inventory or receivables in non-financial companies. This unique characteristic may explain why process capital does not have a relationship with firm value in this study. These findings suggest that the unique liquidity and turnover of current assets in banking do not contribute to firm value in the same way that process capital might in other industries. The results of this study found that human capital and innovation capital do not have a relationship with firm value. In contrast, customer capital has a positive relationship with firm value, and process capital has a negative relationship with firm value. The findings confirm the resource-based theory in explaining the relationship between customer capital and firm value but fail to explain the relationship between human capital and process capital with firm value.

The study also highlights that tangible assets should be considered in determining firm value, and intangible assets such as customer and innovation capital have positive relationships with firm value. Therefore, investors can consider intellectual capital when making investment decisions. For companies, these findings emphasize the importance of managing and enhancing intellectual capital, especially customer capital and innovation capital, to increase firm value.

Conclusion and Suggestion

Based on the analysis results, it can be concluded that only two components of intellectual capital have a positive relationship with company value. These two components are innovation capital and customer capital, while human capital and process capital do not have a significant relationship with company value. Innovation capital helps the company compete with competitors through innovations in both services and products. Increasing customer capital signifies that the company has successfully enhanced and maintained its customer base, which aids in boosting the company's revenue and profit. The control variable appropriately included in the model is the capital adequacy ratio (CAR). In contrast, the control variables of non-performing loan (NPL), efficiency ratio (ER), earnings per share (EPS), and company size are not suitable for inclusion in the model.

The first limitation of this study lies in the research location, which has a low level of human capital. Human capital, as one of the main components of intellectual capital, should ideally possess high quality. Future research is recommended to select locations with a higher level of human capital. The second limitation pertains to the type of companies used in the study. This research uses banking companies as the sample, with characteristics different from typical companies. Thus, using companies from other sectors may yield more generalizable results. The third limitation is the measurement of intellectual capital variables, which differs from commonly used measures. Future research could employ alternative measures for the intellectual capital variables.

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