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Digital Transformation Towards Firm Value: The Moderating Role of Intellectual Capital Components

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Abstract

Digital transformation is increasingly viewed as a source of corporate value creation; however, empirical evidence is mixed, suggesting that digitization does not automatically lead to increased corporate value. Based on the resource-based view, this study examines the role of intellectual capital, consisting of human capital, structural capital, and physical capital, in moderating the relationship between digital transformation and corporate value in the consumer non-cyclicals sector in Indonesia. This study uses 167 years of company observations from 2019 to 2023 and analyzes them using panel-data regression with firm fixed effects and cluster-robust standard errors in STATA. The results show that digital transformation and structural capital increase corporate value, while human capital has an adverse effect, and physical capital has no direct effect. Surprisingly, human capital actually weakens the effect of digital transformation on company value, whereas structural and physical capital strengthen this relationship. These findings theoretically extend the resource-based view by highlighting the heterogeneous and interactive role of intellectual capital in digital value creation. In practice, the results suggest that firms prioritize strengthening structural capital and ensuring the readiness of human resources to maximize the value-enhancing effects of digital transformation, particularly in emerging market contexts.

Keywords: *digital transformation; firm value; human capital; structural capital; physical capital*

Introduction

Digital transformation is increasingly important to company value creation as investors shift their focus to evaluating a company's long-term prospects and competitiveness. Investors no longer rely solely on historical financial performance but increasingly consider non-financial signals that reflect a company's ability to adapt to technological changes, innovate, and maintain competitive advantage (Afifah et al., 2021; Damayanti & Prayoga, 2021). A global investor survey conducted by PwC (2025) Shows that digital strategy, innovation capabilities, and organizational readiness have become important components in modern valuation models. This shift in orientation confirms that digital transformation is now seen as a relevant signal that shapes market expectations of a company's future value.

Digital transformation is a strategic change process in which companies not only adopt digital technology but also use it to transform business processes, organizational structures, and decision-making, thereby forming new organizational capabilities that enhance the company's efficiency, innovation, and competitiveness (Vial, 2019). Several empirical studies show that digital transformation has the potential to strengthen company performance through increased operational efficiency and accelerated innovation, which can ultimately be reflected in increased company value (Ren & Lin, 2024; Wang et al., 2023; Zareie et al., 2024). These findings are in line with the Resource-Based View (RBV) perspective, which views digital transformation as a strategic resource that has the potential to create competitive advantage (Barney, 1991).

However, changes in investor orientation towards these non-financial signals are not always followed by an increase in company market value. Data from the Indonesia Stock

Exchange, shown in Figure 1, indicate that during the observation period, the consumer non-cyclicals sector experienced a gradual decline in average closing stock prices, despite the sector being relatively defensive and characterized by increasing adoption of digital transformation.

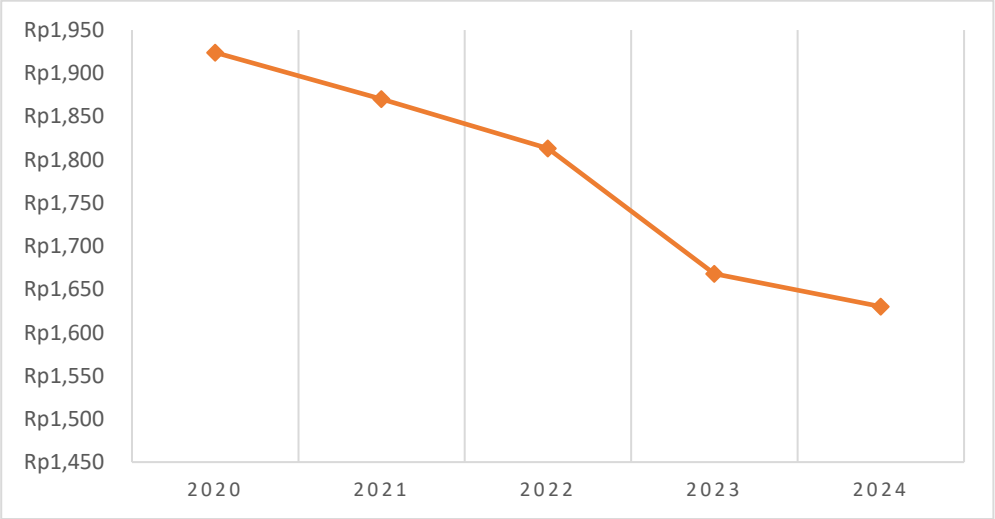

Figure 1. Average Closing Stock Prices of the Non-Cyclical Consumer Sector from 2020 to 2024
Source: *IDX, 2025*

In line with the declining trend in non-cyclical sector stock prices, evidence also shows that digital transformation does not automatically create firm value. Tabrizi et al. (2019) Report that around 70% of digital transformation initiatives fail to achieve their goals due to limitations in organizational readiness, weak internal capabilities, and unprepared corporate structures and processes. Several other studies have found that digitization does not always have a positive impact on corporate value (Mustaqim et al., 2025; Rafi et al., 2024), and can even reduce it when its implementation is inefficient or not aligned with corporate strategy (Handayani et al., 2022; Guo et al., 2021). The inconsistency of these findings indicates that the relationship between digital transformation and company value is context-dependent and depends on a company's internal conditions.

These conditions reveal a research gap regarding the internal mechanisms that determine whether digital transformation can be translated into market-recognized economic value. Within the Resource-Based View framework, the mere possession of digital technology is insufficient to generate sustainable competitive advantage without the support of adequate internal capabilities (Elia et al., 2021). Intellectual capital is a key element in this context because it represents the accumulation of knowledge, capabilities, and organizational systems that enable the effective utilization of technology (Pulic, 2004). Referring to Yin et al. (2025) Human capital reflects the knowledge, skills, and abilities of human resources that contribute directly to the value creation process; structural capital represents the systems, procedures, and organizational culture that enable individual knowledge to be internalized and utilized consistently; while physical capital indicates the efficiency of the company's use of physical and financial resources in generating added value. Thus, intellectual capital is seen as a factor that determines the extent of digital transformation's influence on company value.

This study contributes to expanding the literature by testing intellectual capital as a moderating variable in the relationship between digital transformation and company value, a role that has been relatively unexplored compared to its position as a predictor or mediator (F. Bai et al., 2024; Yin & Xu, 2025). Furthermore, most previous studies have focused on the banking sector or on sectors with high levels of digitalization, so the generalizability

of findings to the consumer non-cyclical sector remains limited (Febriansyah et al., 2025; Frimayasa et al., 2025; Sutanto et al., 2024). This gap is important to address because, without a sufficient understanding of the conditions under which digital transformation creates value, companies risk inefficient digital investments. At the same time, investors may misjudge a company's prospects.

Based on the above explanation, this study analyzes the impact of digital transformation on company value. It examines the role of intellectual capital as a moderating variable measured through human capital, structural capital, and capital employed in consumer non-cyclical companies listed on the Indonesia Stock Exchange. Based on the Resource-Based View, this study argues that digital transformation can affect company value differently, depending on the company's internal capabilities, as reflected in its intellectual capital.

This study offers novelty by placing intellectual capital as a moderating variable in the relationship between digital transformation and company value, rather than merely as a direct explanatory variable as in previous studies. By separating intellectual capital into human capital, structural capital, and capital employed, this study provides a more specific understanding of the internal capabilities of companies that influence the effectiveness of digital transformation. Furthermore, the focus on non-cyclical consumer companies in Indonesia's emerging market remains relatively limited in the literature, even though this sector plays a strategic role and has distinct characteristics. Therefore, this study is important for enriching Resource-Based View-based research and for providing practical implications for companies seeking to optimize corporate value through digital transformation.

Resource-Based View (RBV)

The Resource-Based View (RBV) explains that a company's competitive advantage depends on its ability to manage internal resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). The Resource-Based View (RBV) emphasizes not only asset ownership but also the organization's capabilities in managing those assets to create economic value (Wernerfelt, 1984). This theory also asserts that companies must build a strategic position based on internal resources and capabilities, not just on the products or services they offer. From a resource-based view (RBV) perspective, tangible resources (physical assets), intangible resources (knowledge, skills, reputation, and organizational culture), and company capabilities reflect a company's ability to create competitive advantage and generate sustainable added value. In the context of this study, digital transformation and intellectual capital are two forms of strategic assets that can meet the VRIN criteria, especially when effectively integrated into corporate strategy. These strategic assets can be used to develop corporate capabilities, which, in turn, improve performance and corporate value over time.

Signaling Theory

Signaling theory explains that companies send signals to the market to reduce information asymmetry between management and investors, where these signals reflect the quality of the company and its prospects (Connelly et al., 2011; Spence, 1973). In this framework, digital transformation serves as a strategic signal of management's commitment to innovation, technological readiness, and a long-term growth orientation. Intellectual capital, which includes human, structural, and capital employed efficiency, complements these signals by reflecting the company's ability to manage tangible and intangible resources effectively. The existence of substantial intellectual capital enhances the credibility of digital transformation signals, making the market more likely to interpret digital initiatives as value-creating activities that positively impact company value (Healy & Palepu, 2001; Moolkham, 2025).

The Impact of Digital Transformation on Firm Value

Within the Resource-Based View (RBV) framework, corporate value is created when a company develops and exploits internal resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). According to Vial (2019), digital transformation is a process that aims to improve an organization's performance by introducing significant changes to its characteristics through a combination of information technology, computing, communication, and connectivity. When digital technology is managed effectively, it can become a valuable resource by increasing operational efficiency and information quality, and it is not easy to imitate because it is embedded in the company's internal routines and processes.

Causally, digital transformation is related to company value through several mechanisms. First, digitization contributes to increased operational efficiency and flexibility, which is further reflected in improved profitability and future cash flow (Guo et al. 2021). Second, digital capabilities open up opportunities for product and service innovation, thereby strengthening the company's competitive position (Blichfeldt et al. 2021). Third, digital transformation can be perceived as a strategic signal to investors regarding the company's readiness to face market dynamics and technological uncertainty, which shapes market expectations of the company's long-term performance (W. Chen et al., 2022). In line with this, company value measured using Tobin's Q reflects market assessments of prospects, so that digital transformation is reflected in an increase in company value (Ren et al. 2024).

Previous empirical findings support this mechanism. Ma et al. (2022) Show that companies that have successfully undergone digital transformation can increase company value through operational efficiency, innovation, and expanded market access. Guo et al. (2021) and Zhang et al. (2025) Also found that digital transformation contributes positively to firm value. Based on the RBV theoretical argument and empirical evidence, this study formulates the following hypothesis:

H_1: *Digital Transformation has a positive effect on Firm Value*

The Influence of Human Capital (HC) on Firm Value

According to Pulic (2004)Human capital is the knowledge, skills, competencies, experience, and abilities inherent in employees, which are the primary sources of value creation for companies. In the Resource-Based View (RBV) framework, human capital is considered a strategic resource because employees' knowledge, skills, and experience are inherent to individuals and cannot be easily imitated by competitors. RBV asserts that internal resources can form the basis of sustainable competitive advantage when they meet the characteristics of being valuable, rare, inimitable, and non-substitutable (Barney, 1991). In this context, human capital meets the VRIN criteria when employee competencies are specific to the company, have been accumulated through organizational learning processes, and are integrated into the company's routines and work processes.

RBV further argues that strategic resources create value when they enable companies to improve efficiency and effectiveness in strategy implementation (Barney, 1991). Based on RBV logic, human capital contributes to value creation by strengthening organizational capabilities, including productive capacity, decision-making quality, and innovation capacity (Ortega-Lapiedra et al., 2019). In addition, the RBV literature emphasizes the role of human capital in building absorptive capacity, which is the ability of companies to identify, absorb, and utilize new knowledge (Ahmed et al., 2024). This increase in capabilities is expected to improve the company's long-term performance prospects, which are then reflected in market valuations and company value.

Empirical findings support these theoretical predictions. Sisodia et al. (2021) and Yousaf (2024) Show that the quality and productivity of human resources are positively related to company performance and value. Jaunanda et al. (2024) Also found that

continuous investment in human capital development is an important determinant of long-term value creation. Referring to the RBV framework and existing empirical evidence, this study formulates the following hypotheses:

H₂: *Human Capital (HC) has a positive effect on Firm Value*

The Effect of Structural Capital (SC) on Firm Value

In the Resource-Based View (RBV) framework, structural capital represents knowledge, systems, and organizational mechanisms that are institutionalized and remain within the company even when there is employee turnover (Barney, 1991). Structural capital includes operational procedures, information systems, organizational routines, and managerial infrastructure that support coordination and decision-making. When consistently integrated into operational activities, structural capital exhibits the characteristics of being valuable and imperfectly imitable because it is specific to the company and formed through complex, historical organizational processes.

Based on RBV logic, structural capital acts as a value-creation mechanism by reducing coordination costs, improving the quality and speed of information flow, and ensuring business-process consistency. (Hapsari et al., 2022). Well-documented systems and procedures enable companies to operationalize strategies more effectively and reduce dependence on specific individuals. Thus, structural capital helps companies convert other resources into value-added outputs more efficiently and sustainably.

The implications of this mechanism are reflected in the company's operational performance and market perception. Substantial structural capital increases the reliability of internal processes and performance stability, which investors perceive as a signal of the organization's capacity to maintain competitive advantage. Several empirical studies support this argument. Welly et al. (2021) and Ahmed et al. (2022) Show that effective organizational systems and structural capital contribute positively to financial performance and company value. Based on the RBV framework and this empirical evidence, the following hypothesis is formulated:

H₃: *Structural Capital (SC) has a positive effect on Firm Value. The Effect of Physical Capital (PC) on Firm Value*

The Effect of Physical Capital (PC) on Firm Value

Within the Resource-Based View (RBV) framework, physical capital, which includes physical and financial assets, can be a strategic resource when utilized efficiently and combined with other organizational capabilities. (Barney, 1991). RBV asserts that internal resources create value when they increase the efficiency and effectiveness of a company's strategy implementation. In measuring the Value Added Intellectual Coefficient (VAIC), the efficiency of physical capital utilization is represented by Capital Employed Efficiency (CEE), which reflects a company's ability to generate added value from the capital used in operational activities. (Pulic, 2004).

Based on the logic of RBV, the efficient use of physical capital enables companies to optimize asset productivity, control operational costs, and increase production capacity and service quality. When physical and financial assets are managed efficiently and integrated into complex and company-specific operational processes, physical capital becomes a valuable resource that is relatively difficult for competitors to imitate. This condition strengthens the company's prospects for long-term operational and financial performance.

Improvements in physical capital efficiency are further expected to be reflected in the market's assessment of the company. Investors tend to interpret asset efficiency as a signal of operational strength and performance sustainability, which positively affects market valuation and firm value (Odat et al. 2022). Empirical findings by Madyan et al. (2022) and Nurseha et al. (2024) Support the positive relationship between physical capital

efficiency and company value. Referring to the RBV framework and existing empirical evidence, this study formulates the following hypothesis

H₄: *Physical Capital (PC) has a positive effect on Firm Value*

The Moderating Role of Human Capital (HC)

Based on the Resource-Based View (RBV), digital transformation can increase firm value when leveraged through valuable and difficult-to-imitate internal resources. Human capital, reflected in employee competencies, experience, and productivity, serves as an internal mechanism that enables companies to translate digital technology into operational practices and managerial decisions, thereby strengthening the impact of digital transformation on firm value.

Causally, higher levels of human capital improve an organization's ability to absorb and integrate digital technology into business processes. Competent employees tend to be better able to utilize digital systems to support data-driven decision-making, which is reflected in more efficient resource allocation and better operational risk management. Improvements in these areas have the potential to yield more stable, efficient financial performance, thereby sending a positive signal to investors about the company's prospects.

Empirical findings show that human capital acts as a contingency factor that strengthens the effectiveness of digital transformation. This is supported by Wu et al. (2024) Who found that companies with higher levels of human capital tend to maximize digital implementation and demonstrate better market performance. Similar results were also reported by Cui (2025), who showed that human capital strengthens the relationship between digital transformation and value creation through improved performance quality. Therefore, human capital is expected to strengthen the relationship between digital transformation and company value.

H₅: *Human Capital (HC) strengthens the relationship between Digital Transformation and Firm Value*

The Moderating Role of Structural Capital (SC)

In the RBV perspective, structural capital is viewed as an organizational resource that enables companies to coordinate activities, store knowledge, and standardize internal processes. Although many companies can adopt digital technology, its practical use depends heavily on the presence of systems, procedures, and control mechanisms specific to the organization. Therefore, structural capital has the potential to be a distinguishing factor in the extent to which digital transformation can produce valuable and sustainable advantages.

Causally, substantial structural capital provides an organizational infrastructure that supports consistent digital technology integration. Structured information systems and procedures improve the quality and reliability of managerial information, reduce operational uncertainty, and increase the consistency of digital strategy implementation. These conditions can affect performance stability and operational efficiency, important indicators for investors assessing a company's prospects and risks.

Empirical evidence supports the role of structural capital as a moderating variable in the relationship between digital transformation and company value. Findings by Zareie et al. (2024) Show that organizational capital helps companies minimize digitization risks, improve information quality, and reduce financing frictions, thereby strengthening the impact of digital transformation on market value. Based on these theoretical arguments and empirical findings, structural capital is expected to strengthen the relationship between digital transformation and firm value.

H₆: *Structural Capital (SC) strengthens the relationship between Digital Transformation and Firm Value*

The Moderating Role of Physical Capital (PC)

Efficiently, and combined with other resources. Digital transformation is a capital-intensive activity, so effective management of physical and financial assets is an important prerequisite for digital investments to provide economic benefits. Physical capital reflects a company's ability to allocate and utilize assets productively, thereby strengthening the impact of digital transformation on company performance and value.

Causally, companies with high capital efficiency tend to direct digital investments to strategically relevant projects supported by adequate physical infrastructure. Effective asset management reduces the risk of capital waste and increases asset productivity, which is reflected in higher returns on investment and greater cost efficiency. These improvements in financial performance could influence market perceptions of the company's prospects.

Empirical findings show that capital efficiency plays a role in strengthening the effectiveness of digital transformation. This is in line with the research by Scafarto et al. (2023), A study found that capital efficiency used in digitalization contributes to improved financial performance, which is then reflected in increased company value. Thus, physical capital is expected to strengthen the relationship between digital transformation and company value.

H7: *Physical Capital (PC) strengthens the relationship between Digital Transformation and the Firm Value Conceptual Research Model*

Conceptual Research Model

To clarify the relationship between the variables studied, this research developed a conceptual model. The model became the basis for testing the research hypothesis.

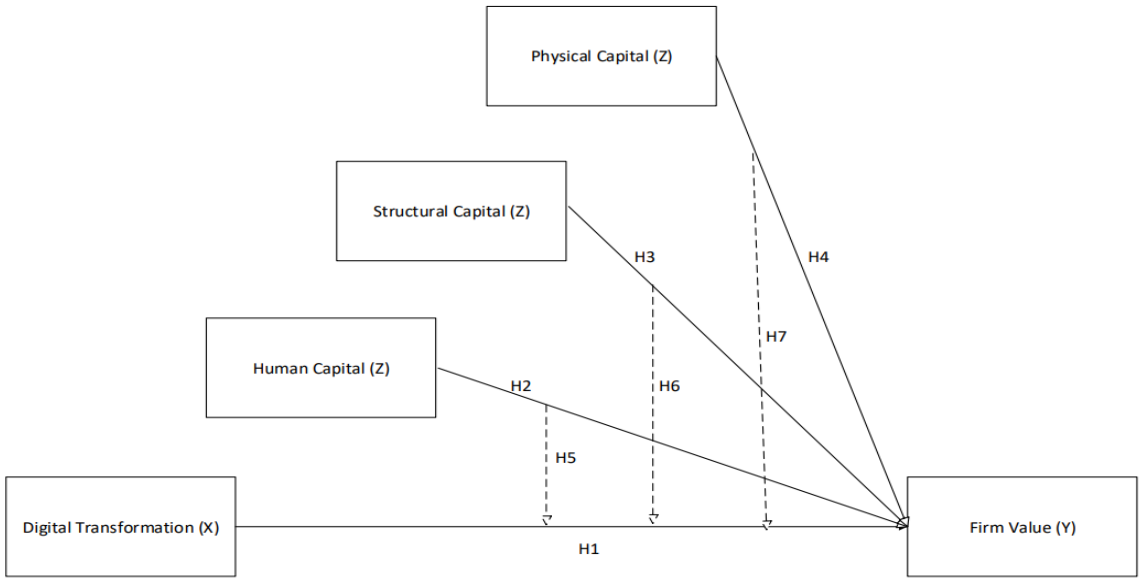

Figure 2. Conceptual Model
Source: *Author Research Data 2025*

Analysis Method

This study uses a quantitative approach with secondary data on non-cyclical companies listed on the Indonesia Stock Exchange (IDX). The selection of the noncyclical consumer sector is based on the phenomenon of weakening company value as reflected in declining market valuations, even though this sector is known to have relatively stable demand. This condition indicates that stable demand does not automatically guarantee an increase in company value, thereby opening the door to test the role of internal factors in value creation. The sample consisted of 38 companies with a total of 167 firm-years of observations, resulting in an unbalanced panel due to differences in data availability

across companies. The sampling technique used was purposive sampling with the following criteria:

- The company is included in the non-cyclical sector listed on the IDX.
- The company's shares are listed on the main board of the IDX.
- The company published annual reports and financial statements for the 20192023 period in rupiah.
- The company has relevant information on the variables used, namely Digital Transformation, Human Capital (HC), Structural Capital (SC), Physical Capital (PC), and Firm Value.

The research uses a fixed effects model based on the theoretical considerations of Wooldridge (2002), which states that fixed effects are more appropriate when the independent variable may correlate with unobserved individual heterogeneity. In non-cyclical sector companies, this condition is highly relevant because differences among companies often stem from fixed internal characteristics, such as a long-standing digital orientation, a more innovative or conservative organizational culture, historical R&D capacity, an entrenched supply chain structure, and the quality of top management. These factors are not explicitly recorded in the data, but they can influence the level of digital transformation and intellectual capital. Therefore, in line with Wooldridge (2002) Argument, the fixed effects model is considered the most appropriate for controlling for company-specific variation, thereby producing more consistent estimates. This study also controls for company characteristics by including company size (SIZE), measured using the natural logarithm of total assets, and leverage (LEV).

Data analysis was conducted through several systematic stages. The initial stage included descriptive statistical analysis to identify general patterns and characteristics of the research variables. Next, model diagnostics were conducted, including heteroscedasticity and autocorrelation tests, to ensure that the basic assumptions for estimation and statistical inference were met. Hypothesis testing was performed using multiple linear regression estimated in two model specifications. The first model tested the direct effect of digital transformation and each component of intellectual capital on firm value. The second model was expanded by including interaction variables between digital transformation and each component of intellectual capital to evaluate the moderating role in the relationship, as formulated in the following model equation.

$$(1)\ Q = \alpha + \beta_1 DT + \beta_2 HC + \beta_3 SC + \beta_4 PC + \beta_5 SIZE + \beta_6 LEV + \varepsilon$$

$$(2)\ Q = \alpha + \beta_1 DT + \beta_2 HC + \beta_3 SC + \beta_4 CE + \beta_5 (DT \times HC) + \beta_6 (DT \times SC) + \beta_7 (DT \times PC) + \beta_8 SIZE + \beta_9 LEV + \varepsilon$$

Where:

Q	= Firm Value
a	= Constant
β1 – β9	= Regression coefficient for each variable
DT	= Digital Transformation
HC	= Human Capital
SC	= Structural Capital
PC	= Physical Capital
SIZE	= Company Size
LEV	= Leverage
DT × HC; DT × SC; DT × PC	= Moderating Interaction
E	= Error term

Measurement of Variables

To ensure clarity and consistency of measurement, this study establishes operational definitions and variable indicators as presented in Table 1.

Table 1. Measurement of Variables

Variable	Sources	Measurement
Firm Value (Y)	(Averio et al., 2024; Fitri Handayani et al., 2022; Pramono et al., 2022)	$Q = \frac{(MVE + DEBT)}{BTA}$
Digital Transformation (X)	(Anabel & Hidayat, 2025; Chao et al., 2024; Hu et al., 2025; Xie & Wang, 2023)	$DTI = \frac{\sum indikator\_DT}{Total\ Indikator}$
Intellectual Capital (Z)	(Kumala et al., 2023; Pratama et al., 2019; Pulic, 2004)	$VAIC = HCE + SCE + CEE$
Human Capital (Z1)	(Kumala et al., 2023; Pratama et al., 2019; Pulic, 2004)	$HCE = \frac{VA}{HC}$
Structural Capital (Z2)	(Kumala et al., 2023; Pratama et al., 2019; Pulic, 2004)	$SCE = \frac{SC}{VA}$
Physical Capital (Z3)	(Kumala et al., 2023; Pratama et al., 2019; Pulic, 2004)	$CEE = \frac{VA}{CE}$
Firm Size (Control)	(Aryadita et al., 2024; Averio et al., 2024; Santosa & Salma, 2023)	Size = Ln (Total Assets)
Leverage (Control)	(Arya & Saputra, 2019; Santosa & Salma, 2023)	$\text{Lev} = \frac{\text{Total Liabilities}}{\text{Total Equity}}$

The level of digital transformation is measured using a Digital Transformation Index based on firms' annual reports, which reflect their adoption of digital strategies and practices. The indicators are detailed in Table 2, which forms the basis for this variable.

Table 2. Adoption Digital Transformation Index

Digital Transformation Dimension	Digitalization Domain	Digital Transformation Practices	Measurement Criteria
Digital Transformation Index	Strategy Digitalization	Digital technology references	Keywords existing in annual report: artificial intelligence, big data, cloud computing, blockchain, online and mobile.
	Business digitization	Digital Marketing	Whether using digital platforms for marketing and promotion
		Digital products	Whether or not e-commerce is open
		Digital R&D	The company has patent applications related to digital technology.
	Management Digitization	Digital architecture	Whether organizational restructuring is taking place internally
		Directors with an IT background	Presence of board members with an IT background
		Executives with an IT background	Presence of executive team members with an IT background
		Digital Cooperation	Whether investment partnerships with external technology companies were undertaken during the year

Source: *Adapted from Hu et al. (2025).*

Results and Discussion

Result

Descriptive Statistical Analysis

Descriptive statistical analysis was used to provide an overview of the research data. The results of the analysis are presented in Table 3.

Table 3. Descriptive Statistical Analysis Results

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Firm Value	167	1.993765	2.116552	0.1706985	14.41466
Digital Transformation	167	0.6796407	0.228305	0.0833333	1
Human Capital	167	6.382519	4.796287	0.7239081	29.10586
Structural Capital	167	0.7508728	0.19296	-0.3813909	0.9656427
Physical Capital	167	0.8951178	1.081464	0.0875906	11.40674
VAIC	167	8.028509	5.152396	0.5348999	31.49503
Size	167	29.97774	1.476612	27.46694	34.80783
Leverage	167	1.241785	1.414141	0.1028216	13.05127
Trimmed at 1%					

Source: *Author Research Data 2025*

After trimming outlier values to improve data quality and reliability, eight observations were excluded because they deviated significantly from the distribution patterns of the research variables. Outliers were removed to ensure that model estimates were not distorted by values that could introduce bias. Thus, the final sample size used in the empirical analysis was reduced to 167 observations. This procedure is expected to produce more accurate, representative, and methodologically accountable test results.

Based on the descriptive statistical analysis in Table 3, the average Tobin's Q is 1.993765, indicating that the market value of the company exceeds its book value. Based on the criteria, a Tobin's Q value greater than 1 indicates that the company's management is considered successful in managing assets, so that the company is classified as overvalued (Sudiyatno B & Puspitasari E, 2010). This shows that the market considers management capable of effectively utilizing assets, reflecting positive growth prospects and the company's ability to create value.

The average digital transformation value of 0.6796407 indicates that the companies in the sample have a relatively high level of disclosure of their digital transformation activities, as indicated by the index calculation results. This measurement was carried out by calculating the frequency of keywords related to digital initiatives in annual reports, then dividing it by the total indicators used to produce a proportional score between 0 and 1. Thus, the mean value indicates that most companies have consistently demonstrated commitment and involvement in the digital transformation process through structured disclosure in their official documents.

The average VAIC (Value Added Intellectual Coefficient) score for the sample companies was 8.028509. Referring to the classification proposed by (Kamath, 2007) VAIC scores are categorized into four levels, namely: top performers (VAIC > 5), good performers (VAIC between 4 and 5), common performers (VAIC between 2.5 and 4), and bad performers (VAIC < 2.5). With an average VAIC of 8.028509, the companies in this study are categorized as top performers. This means the companies have a high level of intellectual capital efficiency in their operations.

Classical Assumption Test

Analysis of Heteroscedasticity and Serial Correlation Test Result

Heteroscedasticity and autocorrelation tests were conducted to ensure that the regression model's classical assumptions were met. The results of the heteroscedasticity and autocorrelation tests are presented in Table 4.

Table 4. Heteroscedasticity and Serial Correlation Tests

Model 1		Model 2	
Observation	167	Observation	167
Heteroscedasticity		Heteroscedasticity	
Chi2	1150829.03	Chi2	196944.86
Prob>Chi2	0.0000	Prob>Chi2	0.0000
Serial Correlation		Serial Correlation	
F	4.699	F	5.001
Prob>F	0.0377	Prob>F	0.0324

Source: *Author Research Data 2025*

The test results show that both models experience heteroscedasticity (Prob > Chi² = 0.0000) and autocorrelation (Prob > F < 0.05), so conventional standard errors are less reliable. Therefore, this study uses clustered standard errors at the company level, which corrects both problems simultaneously. This approach is in line with Cameron et al. (2015), who state that cluster-robust inference remains valid even if the model faces heteroscedasticity and autocorrelation within a cluster, as long as the correlation occurs only within companies and not between them. Thus, the use of clusters at the company level makes the standard error estimation more consistent and produces unbiased significance tests.

Multiple Regression Analysis

Hypothesis Test Result (Model 1)

Multiple regression analysis is used to test the effect of independent variables on dependent variables. The hypothesis testing results for Model 1 are presented in Table 5. This model examines the direct effect of digital transformation on firm value before incorporating the moderating role of intellectual capital.

Table 5. Hasil Analisis Regresi Model 1

Hypothesis	Coefficient	Std. Error	T Value	P>|t|	Result
DT→ Q	0.4709224	0.1457232	3.23	0.032**	Accepted
HC → Q	-0.0311156	0.0098412	-3.16	0.034**	Rejected
SC → Q	0.2600531	0.0414757	6.27	0.003***	Accepted
PC → Q	0.2345456	0.2843317	0.82	0.456	Rejected
R-Squared	0.0434				
F	23.41				
Prob>F	0.0044***				
Observation	167				
*10% Sign					
**5% Sign					
***1% Sign					

Source: *Author Research Data 2025*

Regression results using fixed effects and clustered standard errors show that digital transformation (β = 0.4709; p = 0.032) and structural capital (β = 0.2601; p = 0.003) have a significant positive effect on firm value, confirming that digital adoption and the effectiveness of internal processes and structures are factors valued by the market in determining company value. Conversely, human capital shows a significant negative coefficient (β = −0.0311; p = 0.034), and physical capital is insignificant (β = 0.2345; p = 0.456), indicating that labor and physical capital efficiency are not yet significant company determinants of value in the non-cyclical sector. Although the R^2 value is relatively small at 4%, the model remains significant overall (F = 23.41; p = 0.0044), indicating that the variables in the model make a statistically significant contribution to explaining variation in firm value.

Hypothesis Test Result (Model 2)

Multiple regression analysis was used to test the role of moderating variables in the relationship between independent and dependent variables. The results of the hypothesis testing in Model 2 are presented in Table 6.

Table 6. Results of Regression Analysis Model 2

Hypothesis	Coefficient	Std. Error	T Value	P>|t|	Result
DT*HC → Q	-0.2092877	0.0543683	-3.85	0.018**	Rejected
DT*SC → Q	4.18905	1.148018	3.65	0.022**	Accepted
DT*PC → Q	1.522431	0.478424	3.18	0.033**	Accepted
R-Squared	0.0793				
F	29.62				
Prob>F	0.0026***				
Observation	167				
*10% Sign					
**5% Sign					
***1% Sign					

Source: *Author Research Data 2025*

The moderation model results show that the effects of digital transformation are not uniform across all components of intellectual capital. The DT*HC interaction has a significant negative impact (β = −0.2093; p = 0.018), indicating that human resource efficiency actually weakens the relationship between digital transformation and firm value, possibly because the increase in digitalization has not been fully integrated with workforce competencies in the non-cyclical sector. Conversely, the DT*SC (β = 4.1891; p = 0.022) and DT*PC (β = 1.5224; p = 0.033) interactions have a significant positive effect, confirming that a strong organizational structure and efficient capital utilization can strengthen the impact of digital transformation on company value. The model as a whole is significant (F = 29.62; p = 0.0026), with an R^2 of 0.0793, indicating an increase in predictive ability compared to the main model.

Discussion

The Impact of Digital Transformation on Firm Value

The results show that digital transformation has a significant positive effect on firm value, indicating that the market views its adoption as a strategic capability rather than merely an operational activity. This finding is reinforced by descriptive statistics showing that 68% of the sample companies have disclosed elements of digital transformation in accordance with the measurements used in this study. This high level of disclosure indicates that digital transformation has been widely adopted across the research sample.

Empirically, the dominance of digital disclosure reflects the characteristics of the consumer non-cyclical sector, which is defensive and oriented towards stable demand. Companies in this sector tend to use digital technology not for disruptive innovation but to improve operational efficiency, expand market access, and maintain service continuity. This is reflected in the measurement results, which show that digitalization strategies are the most widely used approach, contributing 42% of total digital disclosures. These strategies are dominated by online and mobile technologies, which account for the largest share (11%) of the other technologies, such as artificial intelligence, blockchain, big data, and cloud computing.

These findings indicate that digital transformation in the consumer non-cyclicals sector is more focused on the use of digital technology for operational activities and consumer interactions, as reflected in the dominance of online and mobile-based technology disclosures. In this context, the use of online and mobile technologies improves value chain efficiency and expands market reach without significantly increasing business risk. Therefore, although the adoption of advanced technologies such as AI and big data is emerging, the strategic value of digital transformation in this sector stems more from

companies' ability to integrate digital technologies into their core business processes.

From a Resource-Based View (RBV) perspective, these findings confirm that digital technology creates value not solely because of its sophistication, but because of its ability to be effectively utilized as a resource-in-use. The positive impact of digital transformation on firm value shows that the market responds favorably to companies that can implement digitization consistently and in a manner relevant to their business model, as this is perceived to improve efficiency, decision-making quality, and future cash flow sustainability. Thus, these results not only confirm the findings of Ma et al. (2022) and Zhang et al. (2025) but also expand the literature by showing that, in the consumer non-cyclical sector, digital transformation serves as a mechanism for strengthening long-term value, rather than merely a trigger for improving current performance. Therefore, the first hypothesis is accepted.

The Influence of Human Capital on Firm Value and Its Role in Moderating Digital Transformation

The study's results show that human capital has a significant negative effect on firm value. The research data findings show that of the total employee expenses, only 20.7 percent is allocated to training and development activities. This proportion indicates that the high human capital efficiency in this study reflects a labor-cost-control strategy rather than an investment in improving the quality and capabilities of human resources.

Empirically, this condition explains why the market interprets increased human capital efficiency as a decline in company value. When companies reduce labor costs without balancing them with adequate investment in training, the efficiency achieved is short-term and may sacrifice long-term capability accumulation. In the defensive, operationally stable consumer non-cyclicals sector, the market tends to value performance sustainability over short-term cost savings. Therefore, a low proportion of training investment can be perceived by investors as a signal of limited competency development and weak company readiness to face future business dynamics, thereby negatively impacting firm value (Veselinović et al., 2022).

From a Resource-Based View (RBV) perspective, these findings challenge the assumption that human capital automatically functions as a strategic resource. The results of this study show that human capital efficiency without continuous investment in training, competency development, and skill enhancement is insufficient to create market-valued competitive advantages. These findings are in line with Trinita et al. (2019) dan William et al. (2019) Who found that human capital efficiency can negatively impact company value unless accompanied by strengthening internal capabilities? Theoretically, these results indicate that human capital efficiency without strategic investment is insufficient to increase company value, while investment in training and human resource development supported by complementary assets (R&D and physical capital) tends to produce better economic performance and positive market responses (Bai, 2024). Therefore, the second hypothesis is rejected.

The results of the moderation test show that human capital also negatively moderates the relationship between digital transformation and firm value. This finding indicates that high human resource efficiency actually weakens the positive impact of digital transformation on company value. Causally, digital transformation requires employees to absorb new technologies, adapt work processes, and integrate digital systems into operational activities. However, the low proportion of investment in training (20.7 percent) indicates that companies have not fully prepared their workforce with adequate skills and capabilities, including digital skills.

This condition can lead to skill mismatches, increased resistance to change, and limitations in the organization's ability to realize economic benefits from digital investments. As a result, even though companies are undergoing digital transformation, the added value generated cannot be maximized due to limitations in human resource capabilities. Within the RBV framework, this indicates that efficient but poorly trained human capital is unable

to function as a complementary asset to digital technology, thereby weakening the synergy between digital transformation and corporate value creation (Gun et al., 2024; Li et al., 2024).

Thus, both the direct influence and the moderating role of human capital in this study confirm that labor efficiency without the support of training and competency development investments can reduce firm value. This finding expands the understanding of RBV by showing that human capital only creates value when cost efficiency is balanced with the development of relevant capabilities, especially in the context of digitalization. Therefore, this study empirically explains why the relationship between human capital and firm value is negative and why human capital weakens the effectiveness of digital transformation, thereby rejecting the related hypothesis.

The Influence of Structural Capital on Firm Value and Its Role in Moderating Digital Transformation

The results show that structural capital has a significant positive effect on firm value. Descriptively, structural capital shows a relatively stable average value and lower variation than other components of intellectual capital, indicating that organizational systems, work procedures, and knowledge management mechanisms have been standardized to a similar degree across the companies in the sample. This stability reflects the fact that structural capital is institutionalized and does not depend on specific individuals, making it easier for the market to observe and evaluate it as a source of sustainable value creation.

Empirical evidence indicates that structural capital directly influences firm value, as the market appreciates the capabilities embedded in a company's internal structure and systems. In the context of the defensive and operationally stable consumer non-cyclicals sector, the existence of consistent information systems, work procedures, and coordination mechanisms plays an important role in maintaining the efficiency and sustainability of business processes. These findings support the Resource-Based View (RBV) perspective, which emphasizes that a company's internal capabilities can be a source of competitive advantage when managed effectively (Barney, 1991), and are consistent with the findings Nguyen (2024), Welly et al. (2021), dan (Z. Ahmed et al., 2022).

Beyond its direct influence, the test results indicate that structural capital also strengthens the relationship between digital transformation and firm value. Causally, these moderation results indicate that digital transformation generates greater value when supported by mature organizational structures and internal systems. Structural capital functions as a coordination mechanism that enables the integration of digital technology into business processes more effectively, reduces implementation uncertainty, and improves the consistency of digitization outcomes. These findings are in line with Zareie et al. (2024) Information systems literature emphasizes that digital technology creates value when supported by adequate organizational structures and practices (Nadeem et al., 2018; Tallon et al., 2019).

By simultaneously linking direct effects and moderating roles, these findings show that structural capital acts as an organizational enabler in the context of digital transformation rather than as the sole determinant of company value. Within the RBV framework, these results expand the understanding that company value is not only determined by the adoption of digital technology, but also by the readiness of internal structures and systems that ensure that digitization can be utilized consistently and sustainably (Barney, 1991; Kraaijenbrink et al., 2010; Suzan et al., 2023). Therefore, structural capital increases firm value through contextual and capability-based mechanisms, thereby supporting the related hypothesis.

The Influence of Physical Capital on Firm Value and Its Role in Moderating Digital Transformation

Based on the descriptive statistical analysis in Table 3, physical capital, measured by

capital employed efficiency, has a standard deviation of 1.0, which is lower than human capital (4.7) but higher than structural capital (0.1). This pattern shows that the efficiency of physical and financial capital utilization in consumer non-cyclical sector companies is relatively homogeneous, though less standardized than their structural capabilities. Given the variation between human capital and structural capital, physical capital does not exhibit sufficient heterogeneity to be a significant distinguishing factor in the market's assessment of company value.

Empirically, the insignificant direct effect of physical capital indicates that the market does not assess the efficiency of physical assets as a standalone source of competitive advantage. In the context of the defensive and mature consumer non-cyclicals sector, asset structure and capital requirements are relatively stable, so that physical capital efficiency is seen more as a minimum condition (hygiene factor) that companies must meet, rather than as a strategic signal that increases market valuation. This finding is in line with the view that physical resources do not always translate directly into an increase in firm value when they are not a key differentiator (Intara & Suwansin, 2024; Rennath & Wijaya, 2024; Saleh, 2018). Furthermore, the argument by Parimarma et al. (2023) Suggests that the ability of top management to manage capital employed is more accurately understood as a mechanism for improving a company's financial performance, rather than as a direct determinant of company value. In line with this view, the literature confirms that physical asset efficiency tends to have an indirect impact through improved operational performance and profitability, which in turn can affect company value gradually and in the long term (Miswanto & Oematan, 2020; Putri Kurniasih & Akhmadi, 2024).

However, the results of the moderation test show that physical capital plays a significant role in strengthening the relationship between digital transformation and firm value. A higher level of physical capital variation compared to structural capital indicates differences in companies' ability to allocate and utilize capital effectively. This difference becomes relevant when companies undergo digital transformation, given that digital initiatives generally require continuous capital investment for technology infrastructure development, system upgrades, and the integration of digital processes into operational activities (Bharadwaj et al., 2013; Vial, 2019).

Thus, physical capital does not function as a direct determinant of company value, but as an enabling resource that allows digital transformation to generate more optimal economic benefits. Companies with better capital efficiency have greater flexibility in directing digital investments, thereby strengthening the impact of digital transformation on firm value. This finding is consistent with Chen et al.2023), which shows that companies with higher capital efficiency can derive greater economic benefits from digitization initiatives in terms of performance and market value. Furthermore, these results are in line with the view that digital transformation does not automatically create value, but rather depends heavily on a company's ability to combine digital technology with efficiently managed internal resources (Teece, 2018; Verhoef et al., 2021). Thus, these findings expand the Resource-Based View (RBV) by emphasizing that physical capital plays a critical enabling role in bridging digital transformation and corporate value creation, thereby supporting the seventh hypothesis.

Conclusion

This study shows that digital transformation has a significant positive effect on firm value, confirming digital technology as a strategic resource in the RBV perspective. Structural capital contributes positively, while human capital contributes negatively, and physical capital is insignificant, indicating that the quality of capabilities and internal structure are more decisive for company value than capital efficiency. Moderating analysis reveals that structural capital and physical capital strengthen the effect of digital transformation. In contrast, human capital weakens it, indicating that human resource

efficiency without digital readiness can hinder value creation. These findings extend RBV by emphasizing the interaction between capabilities, structure, and human resource readiness as mechanisms for digital value creation, and provide new empirical evidence in emerging markets.

This research has strategic, practical implications for companies and stakeholders. For companies, it is important to balance digital investment with human resource capability development, prioritize strengthening structural capital as a foundation before implementing digital technology, and ensure that human capital is digitally ready so that human resource efficiency contributes positively to company value. Investors are advised to assess the quality of organizational structure as an indicator of long-term prospects. At the same time, regulators and policymakers can promote digital literacy, human resource development, and good IT governance practices to enhance the competitiveness of the non-cyclical consumer sector in emerging markets. These findings confirm that firm value is created through the interaction between digital resources, structural capabilities, and human resource readiness, expanding the understanding of RBV in the context of digitalization.

The limitations of this study include its focus on a single sector and a limited time period. Future research should use dynamic panels (GMM) to address potential endogeneity, adopt text mining or machine learning-based digital transformation measurements, expand the coverage of sectors and periods, and conduct cross-country comparisons. In addition, including variables such as innovation, digital capability, or corporate governance can enrich our understanding of the mechanisms of value creation. Overall, this study makes theoretical and empirical contributions by confirming the moderating effect of intellectual capital on digital transformation and is relevant to the global literature on value creation strategies in emerging markets.

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