

The Effect of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Value with Firm Size as an Intervening Variable in Infrastructure Companies Listed on the Indonesia Stock Exchange

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ABSTRACT

This study aimed to analyze the effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Value, with Firm Size as an intervening variable, among infrastructure-sector companies listed on the Indonesia Stock Exchange during 2022-2024. The study employed a quantitative approach with an associative research design. The sample comprised 49 companies selected through purposive sampling, yielding 147 firm-year observations. Secondary data were obtained from the companies' annual financial statements and analyzed using path analysis. Equation I produced the following model: $\text{Firm Size} = 23.261 + 0.208X_1 + 0.018X_2 + 0.018X_3 + e$. The results showed that Intellectual Capital and Debt-to-Equity Ratio had positive and significant effects on Firm Size, whereas Return on Equity did not have a significant effect. Equation II produced the following model: $\text{Firm Value} = 661.043 + 47.166X_1 + 4.069X_2 - 1.301X_3 - 2.046Y_1 + e$. Intellectual Capital had a positive and significant effect on Firm Value, Debt-to-Equity Ratio had a negative and significant effect, while Return on Equity and Firm Size did not have significant effects. Simultaneously, the models in Equations I and II were significant, with significance values of 0.001 and 0.000, respectively. The coefficients of determination were 20.3% for Equation I and 28.8% for Equation II. The path analysis results indicated that Firm Size did not mediate the effects of Intellectual Capital, Return on Equity, or Debt-to-Equity Ratio on Firm Value.

INTRODUCTION

Infrastructure companies play an important role in supporting economic activity because their operations are closely related to transportation, construction, telecommunications, utilities, and other facilities required for national development. Based on the IDX Industrial Classification, the infrastructure sector includes companies operating in transportation infrastructure, civil construction, telecommunications, and utility provision (Indonesia Stock Exchange, 2021). The sector is characterized by substantial capital requirements, long

investment payback periods, and a strong dependence on long-term financing (IDX Fact Book, 2025). These characteristics make the management of corporate resources and financing particularly important because investment decisions in infrastructure companies often involve large assets and long-term financial commitments.

During the 2022–2024 observation period, 69 infrastructure-sector companies were listed on the Indonesia Stock Exchange and operated across construction, energy, telecommunications, transportation, and other supporting facilities (Indonesia Stock Exchange, 2025). The market performance of these companies showed considerable variation. For example, SUPR's share price increased from IDR 34,000 per share in 2022 to IDR 39,900 in 2023 and IDR 43,875 in 2024, while the lowest recorded share prices among infrastructure companies were IDR 50 in 2022, IDR 4 in 2023, and IDR 1 in 2024 (Indonesia Stock Exchange, 2022–2024). Financial statement data during the same period also showed considerable differences in revenue, operating expenses, labor costs, equity, profit or loss, liabilities, and total assets. These variations indicate that infrastructure companies faced different conditions in managing their resources, generating returns for shareholders, determining financing structures, and expanding their asset base.

The differences in these financial characteristics are directly related to the variables examined in this study. Technological development and the increasing use of information in corporate activities have strengthened the importance of knowledge-based resources in supporting business activities (Tan et al., 2007). Intellectual Capital represents knowledge, employee expertise, intellectual property, organizational experience, and relationships with external parties that can support the company's ability to create value (Kartika, 2013). Return on Equity reflects the company's ability to generate profit from shareholders' equity (Mahayati, Fatonah, & Meilisa, 2021), while the Debt-to-Equity Ratio reflects the proportion of liabilities relative to equity in the company's financing structure (Yulfitri & Sutarjo, 2021). Firm Size, meanwhile, represents the scale of a company's operations based on the resources and assets under its control (Soebiantoro, 2007). In the capital market, Firm Value reflects investors' assessment of the company, which can be observed through changes in share prices and the relationship between market value and accounting value (Harmono, 2015; Brigham & Houston, 2018).

The relationship among these variables can be explained from several theoretical perspectives. Signaling theory explains that corporate financial information can communicate the company's condition and prospects to investors when information asymmetry exists between management and the market (Ross, 1977). From the resource-based view, a company's ability to manage tangible and intangible resources can provide a foundation for competitive advantage and corporate development (Wernerfelt, 1984; Barney, 1991). Intellectual Capital can therefore be viewed as an internal strategic resource associated with knowledge, organizational capability, and value creation (Roos et al., 1997, as cited in Ulum, 2008). At the same time, decisions regarding corporate resources and financing also involve the interests of management and shareholders (Jensen & Meckling, 2019). In terms of debt financing, trade-off theory explains that companies consider the benefits of debt alongside the increasing risk of financial distress (Myers, 1984).

Previous empirical findings, however, have not shown consistent relationships among Intellectual Capital, Return on Equity, Debt-to-Equity Ratio, Firm Size, and Firm Value. Putri et al. (2019) found that ROE and DER affected Firm Value, whereas Firm Size did not affect

Firm Value. Siddik and Chabachib (2017) found that DER affected PBV, while ROE and Firm Size affected DER, and ROE affected PBV through DER. Savira and Ferdian (2024) reported that DER and ROE affected Firm Value in the infrastructure, utilities, and transportation sectors. More recent studies have also shown that Intellectual Capital, solvency, and leverage are related to corporate financial performance. Syarafina, Munira, and Damayanti (2025) found that Intellectual Capital and solvency affected the financial performance of infrastructure-sector companies, while Sari and Meidiaswati (2025) found that leverage affected the financial performance of companies in the infrastructure, utilities, and transportation sectors. These different findings indicate that the relationship between corporate resources, profitability, financing structure, and market valuation remains dependent on the model and characteristics of the companies examined.

The research gap in this study lies not only in the inconsistency of previous empirical findings but also in the position assigned to Firm Size within the relationship between financial and resource-based factors and Firm Value. Previous studies have predominantly examined Firm Size as an independent variable or have used other financial variables as mediators. Putri et al. (2019), for example, positioned Firm Size as an independent variable in explaining Firm Value, whereas Siddik and Chabachib (2017) employed capital structure as an intervening variable. Syarafina, Munira, and Damayanti (2025), meanwhile, examined financial performance as the outcome of Intellectual Capital and solvency. Consequently, the mechanism through which Intellectual Capital, ROE, and DER may be associated with Firm Value through changes in corporate scale has received less attention, particularly among infrastructure companies during the 2022–2024 period.

Firm Size is positioned as an intervening variable in this study because the effects of Intellectual Capital, profitability, and financing decisions may first be reflected in a company's capacity to develop and control its asset base before being reflected in market valuation. Effective management of Intellectual Capital may strengthen organizational capability and support the development of business activities. Profit generated from shareholders' equity may provide financial capacity that can support corporate development, while debt financing can provide additional resources for asset acquisition and project implementation. These conditions may contribute to changes in Firm Size. However, a larger asset base does not automatically lead to higher Firm Value because market valuation ultimately depends on how effectively corporate resources are managed and how investors assess the risks and prospects associated with those resources. This reasoning makes Firm Size relevant not only as a corporate characteristic but also as a potential mechanism linking Intellectual Capital, ROE, and DER with Firm Value.

Based on the financial characteristics of infrastructure companies during 2022–2024, the inconsistencies in previous empirical findings, and the identified gap concerning the mediating position of Firm Size, this study analyzes the effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Size and Firm Value. Specifically, this study aims to examine the effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Size; examine the effects of Intellectual Capital, Return on Equity, Debt-to-Equity Ratio, and Firm Size on Firm Value; and analyze whether Firm Size mediates the effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Value among infrastructure-sector companies listed on the Indonesia Stock Exchange during 2022–2024.

RESEARCH METHOD

This study employed a quantitative approach with an associative research design to analyze the relationships of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio with Firm Value through Firm Size as an intervening variable. The associative method is used to examine relationships between two or more variables (Sugiyono, 2018). The study used secondary data collected through documentation from companies' annual financial statements available on the official website of the Indonesia Stock Exchange. Secondary data are obtained indirectly by researchers through documents or other parties (Sugiyono, 2018). Documentation involves reviewing written documents containing information about organizational activities (Silaen, 2018). The study population comprised 69 infrastructure-sector companies listed on the Indonesia Stock Exchange. The sample was selected using purposive sampling based on the criterion that companies published complete financial statements throughout 2022-2024. Purposive sampling is a sampling technique based on specific considerations (Sugiyono, 2018). Based on these criteria, 49 companies were selected, yielding 147 firm-year observations.

Firm Size was measured using the natural logarithm of total assets (Hartono, 2015). Firm Value was proxied by Price-to-Book Value, defined as the ratio of share price to book value per share (Brigham & Houston, 2018). Intellectual Capital was measured using the Value Added Intellectual Coefficient, comprising Value Added Capital Employed, Value Added Human Capital, and Structural Capital Value Added (Ulum, 2009). Return on Equity was calculated by dividing net income after tax by total equity (Kasmir, 2018). The Debt-to-Equity Ratio was calculated by dividing total debt by total corporate equity (Kasmir, 2018). Before hypothesis testing, the data were subjected to classical assumption tests, including the Kolmogorov-Smirnov normality test, multicollinearity testing based on Tolerance and Variance Inflation Factor values, the Durbin-Watson autocorrelation test, the Glejser heteroscedasticity test, and the Lagrange Multiplier linearity test. The normality test was used to assess the data distribution before applying parametric statistical analysis (Siregar, 2017). Multicollinearity, autocorrelation, heteroscedasticity, and linearity tests were used to confirm the adequacy of the regression model specifications (Ghozali, 2016).

Data were analyzed using path analysis to examine the direct and indirect effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Value through Firm Size as an intervening variable. The analysis consisted of two regression equations. Equation I examined the effects of Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio on Firm Size, while Equation II examined the effects of Intellectual Capital, Return on Equity, Debt-to-Equity Ratio, and Firm Size on Firm Value.

The path analysis equations were formulated as follows: Equation I: $Y_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_1$. Equation II: $Y_2 = \alpha + \beta_4 X_1 + \beta_5 X_2 + \beta_6 X_3 + \beta_7 Y_1 + \varepsilon_2$. where X_1 represents Intellectual Capital, X_2 represents Return on Equity, X_3 represents Debt-to-Equity Ratio, Y_1 represents Firm Size, Y_2 represents Firm Value, α represents the constant, β represents the regression or path coefficients, and ε represents the residual term.

Multiple correlation analysis was used to determine the strength of the relationships among the research variables, while the coefficient of determination was used to measure the extent to which the independent variables explained variations in the dependent variables. The F-test was used to examine the simultaneous effects of the independent variables, whereas the t-test was used to examine the partial effect of each independent variable at a significance level of 5% (Ghozali, 2016). A hypothesis was considered supported when the significance value was less than 0.05 and not supported when the significance value was greater than 0.05.

The mediating role of Firm Size was examined by comparing the direct and indirect effects obtained from the path analysis. The indirect effect of each independent variable on Firm Value through Firm Size was calculated by multiplying the path coefficient from the independent variable to Firm Size by the path coefficient from Firm Size to Firm Value. The results of the direct and indirect effects were then used to evaluate whether Firm Size played an intervening role in the relationship between Intellectual Capital, Return on Equity, and Debt-to-Equity Ratio and Firm Value.

RESULTS

Classical Assumption Test

a. Normality Test

The Kolmogorov-Smirnov (K-S) method was used to determine whether the residuals were normally distributed as a basis for subsequent analysis. The results of the Kolmogorov-Smirnov (K-S) normality test are presented in Table 1 & 2.

Table 1. Normality Test Results (I)

Test	Value
N (Sample)	147
Test Statistic	0.048
Asymp.Sig.(2-tailed)	.200 ^{c,d}
a. Test distribution is Normal.	

Source: Processed Data, 2026

As shown in Table 1, the Asymp. Sig. (2-tailed) value was $0.200 > 0.05$; therefore, the residuals in Equation I were normally distributed.

The normality test results for Equation II are presented in Table 2.

Table 2. Normality Test Results (II)

Test	Value
N (Sample)	147
Test Statistic	0.077
Asymp.Sig.(2-tailed)	.200 ^{c,d}
a. Test distribution is Normal.	

Source: Processed Data, 2026

As shown in Table 2, the Asymp. Sig. (2-tailed) value was $0.200 > 0.05$; therefore, the residuals in Equation II were normally distributed.

b. Multicollinearity Test

The multicollinearity test was conducted to identify correlations among the independent variables. A regression model is considered free from multicollinearity when $VIF \leq 10$ and $Tolerance > 0.10$. The multicollinearity test results are presented in Table 3 & 4.

Table 3. Multicollinearity Test Results (I)

Variable	Tolerance	VIF
Intellectual Capital	0.985	1.015
ROE	0.960	1.042
DER	0.971	1.030
a. Dependent Variable: Firm Size		

Source: Processed Data, 2026

As shown in Table 3, none of the independent variables had a tolerance value > 0.10 and a VIF value < 10 . These results indicate that there was no multicollinearity among the independent variables. Therefore, there was no multicollinearity problem in the equation I.

The multicollinearity test results for Equation II are presented in Table 4.

Table 4. Multicollinearity Test Results (II)

Variable	Tolerance	VIF
Intellectual Capital	0.931	1.074
ROE	0.959	1.043
DER	0.820	1.220
Firm Size	0.797	1.254

a. Dependent Variable: Firm Value

Source: Processed Data, 2026

As shown in Table 4, Intellectual Capital, ROE, DER, and Firm Size had Tolerance values greater than 0.10 and VIF values below 10. These results indicate that there was no multicollinearity among the independent variables. Therefore, there was no multicollinearity problem in the equation II.

c. Autocorrelation Test

The Durbin-Watson method was used to detect correlations among residuals across periods. A model is considered free from autocorrelation when $dU < d < 4 - dU$. The autocorrelation test results are presented in Table 5 & 6.

Table 5. Autocorrelation Test Results (I)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.450 ^a	0.203	0.170	3.75275	2.157

a. Predictors: (Constant), DER, Intellectual Capital, ROE

b. Dependent Variable: Firm Size

Source: Processed Data, 2026

Based on the autocorrelation test results presented in Table 5, the Durbin-Watson (DW) value was 2.157. This value lies between $dU = 1.6737$ and $4 - dU = 2.3264$, as indicated by $1.6737 < 2.157 < 2.3264$. Based on the decision criteria of the Durbin-Watson test, it can be concluded that there is no autocorrelation in the regression model of Equation I.

The results for Equation II are presented in Table 6.

Table 6. Autocorrelation Test Results (II)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.536 ^a	0.288	0.248	0.54340	2.159

a. Predictors: (Constant), Firm Size, ROE, Intellectual Capital, DER

b. Dependent Variable: Firm Value

Source: Processed Data, 2026

Based on the autocorrelation test results presented in Table 6, the Durbin-Watson (DW) value was 2.159. This value falls between $dU = 1.6878$ and $4 - dU = 2.3122$, as indicated by $1.6878 < 2.159 < 2.3122$. Based on the decision criteria for the Durbin-Watson test, it can be concluded that there is no autocorrelation in the regression model of Equation II.

d. Heteroscedasticity Test

The Glejser method was used to detect unequal residual variances. A model is considered free from heteroscedasticity when the significance value is > 0.05 . The heteroscedasticity test results are presented in Table 7 & 8.

Table 7. Heteroscedasticity Test Results (I)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.447	0.464		7.425	0.000
	Intellectual Capital	-0.002	0.046	-0.005	-0.042	0.967
	ROE	0.014	0.029	0.056	0.477	0.635
	DER	-0.003	0.002	-0.137	-1.170	0.246
a. Dependent Variable: ABS RES1						

Source: Processed Data, 2026

As shown in Table 7, there was no indication of heteroscedasticity in the regression analysis. Intellectual Capital had a significance value of 0.967, ROE had a significance value of 0.635, and DER had a significance value of 0.246. Since all significance values were greater than 0.05, it can be concluded that there was no heteroscedasticity problem in this study.

The heteroscedasticity test results for Equation II are presented in Table 8.

Table 8. Heteroscedasticity Test Results

Table 1: Hierarchical Regression Test Results						
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-100.169	181.184		-0.553	0.582
	Intellectual Capital	1.693	6.450	0.031	0.262	0.794
	ROE	3.999	3.982	0.115	1.004	0.319
	DER	-0.507	0.338	-0.186	-1.500	0.138
	Firm Size	15.094	7.297	0.261	2.069	0.052
a. Dependent Variable: ABS RES2						

Source: Processed Data, 2026

As shown in Table 8, the regression analysis shows no indication of heteroscedasticity. Intellectual Capital had a significance value of 0.794, ROE had a significance value of 0.319, DER had a significance value of 0.138, and Firm Size had a significance value of 0.052. Since all significance values were greater than 0.05, it can be concluded that there was no indication of heteroscedasticity in this study.

e. Linearity Test

The linearity test employed the Lagrange Multiplier approach using the calculated chi-square value ($n \times R$ -squared) to assess the accuracy of the model specification. The linearity test results are presented in Table 9 & 10.

Table 9. Linearity Test Results (I)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.450 ^a	0.203	0.170	3.75275	2.157
a. Predictors: (Constant), DER, Intellectual Capital, ROE					

b. Dependent Variable: Firm Size

Source: Processed Data, 2026

Based on Table 9, the R^2 value was 0.203 with $n = 147$; therefore, the calculated chi-square value was $147 \times 0.203 = 29.841$. The calculated chi-square value was then compared with the critical chi-square value at $df = 147 - 3 = 144$ and a significance level of 0.05, resulting in a critical chi-square value of 173.004. Since the calculated chi-square value of 29.841 was lower than the critical chi-square value of 173.004, it can be concluded that the regression model was linear.

The linearity test results for Equation II are presented in Table 10.

Table 10. Linearity Test Results (II)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.536 ^a	0.288	0.248	0.54340	2.159
a. Predictors: (Constant), Firm Size, ROE, Intellectual Capital, DER					
b. Dependent Variable: Firm Value					

Source: Processed Data, 2026

Based on Table 10, the R^2 value was 0.288 with $n = 147$; therefore, the calculated chi-square value was $147 \times 0.288 = 42.336$. The calculated chi-square value was then compared with the critical chi-square value at $df = 147 - 4 = 143$, and a significance level of 0.05, resulting in a critical chi-square value of 171.907. Since the calculated chi-square value of 42.336 was lower than the critical chi-square value of 171.907, it can be concluded that the regression model was linear.

Statistical Analysis**a. Path Analysis**

Path analysis was used to examine the direct and indirect effects of the independent variables on the dependent variable through the mediating variable. The path analysis results are presented in Table 11 & 12.

Table 11. Path Analysis Results (I)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	23.261	1.017		22.869	0.000
	Intellectual Capital	0.208	0.101	0.217	2.066	0.042
	ROE	0.018	0.064	0.030	0.282	0.779
	DER	0.018	0.005	0.390	3.674	0.000
a. Dependent Variable: Firm Size						

Source: Processed Data, 2026

Based on Table 11, the following regression equation was obtained:

$$Y = 23.261 + 0.208X_1 + 0.018X_2 + 0.018X_3 + e$$

The equation can be interpreted as follows:

- 1) The constant of 23.261 indicates that when Intellectual Capital, ROE, and DER are equal to zero, Firm Size is 23.261.
- 2) The Intellectual Capital coefficient of 0.208 indicates that a one-unit increase in Intellectual Capital increases Firm Size by 0.208 units.

- 3) The ROE coefficient of 0.018 indicates that a one-unit increase in ROE increases Firm Size by 0.018 units.
- 4) The DER coefficient of 0.018 indicates that a one-unit increase in DER increases Firm Size by 0.018 units.

The path analysis results for Equation II are presented in Table 12.

Table 12. Path Analysis Results (II)

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	
1	(Constant)	661.043	296.552		2.229
	Intellectual Capital	47.166	10.557	0.461	4.468
	ROE	4.069	6.517	0.063	0.624
	DER	-1.301	0.553	-0.259	-2.353
	Firm Size	-2.046	11.943	-0.019	-0.171

a. Dependent Variable: Firm Value

Source: Processed Data, 2026

Based on Table 12, the following regression equation was obtained:

$$Y = 661.043 + 47.166X_1 + 4.069X_2 - 1.301X_3 - 2.046X_4 + e$$

The equation can be interpreted as follows:

- 1) The constant of 661.043 indicates that when Intellectual Capital, ROE, DER, and Firm Size are equal to zero, Firm Value is 661.043.
- 2) The Intellectual Capital coefficient of 47.166 indicates that a one-unit increase in Intellectual Capital increases Firm Value by 47.166 units.
- 3) The ROE coefficient of 4.069 indicates that a one-unit increase in ROE increases Firm Value by 4.069 units.
- 4) The DER coefficient of -1.301 indicates that a one-unit increase in DER decreases Firm Value by 1.301 units.
- 5) The Firm Size coefficient of -2.046 indicates that a one-unit increase in Firm Size decreases Firm Value by 2.046 units.

b. Correlation Coefficient Analysis (R)

Correlation analysis was used to test associative hypotheses by identifying the direction and strength of relationships among variables in the research sample. The results are presented in Table 13 & 14.

Table 13. Correlation Coefficient Test Results (R) (I)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.450 ^a	0.203	0.170	3.75275

Predictors: (Constant), DER, Intellectual Capital, ROE.

Source: Processed Data, 2026

As shown in Table 13, the correlation coefficient (R) for the first equation was 0.450, indicating a moderate relationship between Intellectual Capital, ROE, and DER and Firm Size.

The correlation analysis results for Equation II are presented in Table 14.

Table 14. Correlation Coefficient Test Results (R) (II)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.536 ^a	0.288	0.248	0.54340

Predictors: (Constant), Firm Size, ROE, Intellectual Capital, DER

Source: Processed Data, 2026

As shown in Table 14, the correlation coefficient (R) for the second equation was 0.536, indicating a moderate relationship between Intellectual Capital, ROE, DER, and Firm Size as an intervening variable and Firm Value.

c. Coefficient of Determination Analysis (R-squared)

The coefficient of determination (R-squared) was used to measure the ability of the independent variables to explain variation in the dependent variable. The test results showed that the R-squared value for Equation I was 0.203, or 20.3%. This means that Intellectual Capital, ROE, and DER explained 20.3% of the variation in Firm Size, while the remaining 79.7% was influenced by variables outside the research model. For Equation II, the R-squared value was 0.288, or 28.8%. This indicates that Intellectual Capital, ROE, DER, and Firm Size as an intervening variable explained 28.8% of the variation in Firm Value, while the remaining 71.2% was influenced by variables not examined in this study.

d. Simultaneous Effect Test (F-Test)

The F-test was used to assess the statistical significance of the simultaneous effects of the independent variables on the dependent variable and to evaluate the feasibility of the regression model. The F-test results for Equations I and II are presented in Table 15 & 16.

Table 15. Simultaneous Test Results (F Test) (I)

Model	Sum of Squares	Mean Square	F	Significance
Regression	261.506	87.169	6.190	.001 ^b
Residual	1028.069	14.083		

Dependent Variable: Firm Size

Predictors: (Constant), DER, Intellectual Capital, ROE

Source: Processed Data, 2026

As shown in Table 15, the significance value was $0.001 < 0.05$; therefore, Intellectual Capital, ROE, and DER simultaneously had a significant effect on Firm Size.

The F-test results for Equation II are presented in Table 16.

Table 16. Simultaneous Test Results (F-Test) (II)

Model	Sum of Squares	Mean Square	F	Significance
Regression	4264327.478	1066081.869	7.271	.000 ^b
Residual	10557159.181	146627.211		

Dependent Variable: Firm Value

Predictors: (Constant), Firm Size, ROE, Intellectual Capital, DER.

Source: Processed Data, 2026

As shown in Table 16, the significance value was $0.000 < 0.05$; therefore, Intellectual Capital, ROE, DER, and Firm Size simultaneously had a significant effect on Firm Value.

e. Partial Effect Test (t-Test)

The t-test was used to examine the partial effect of each independent variable on the dependent variable. The t-test results for Equations I and II are presented in Table 17 & 18.

Table 17. Partial Test Results (t Test) (I)

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

(Constant)	23.261	1.017		22.869	0.000
Intellectual Capital	0.208	0.101	0.217	2.066	0.042
ROE	0.018	0.064	0.030	0.282	0.779
DER	0.018	0.005	0.390	3.674	0.000
a. Dependent Variable: Firm Size					

Source: Processed Data, 2026

Based on Table 17, the t-test results can be summarized as follows:

- 1) Intellectual Capital had a regression coefficient of 0.208, a t-value of 2.066, and a significance value of $0.042 < 0.05$. These results indicate that Intellectual Capital has a positive and significant effect on Firm Size.
- 2) Return on Equity (ROE) had a regression coefficient of 0.018, a t-value of 0.282, and a significance value of $0.779 > 0.05$. Thus, ROE does not have a significant effect on Firm Size.
- 3) Debt-to-Equity Ratio (DER) had a regression coefficient of 0.018, a t-value of 3.674, and a significance value of $0.000 < 0.05$. These results indicate that DER has a positive and significant effect on Firm Size.

The t-test results for Equation II are presented in Table 18.

Table 18. Partial Test Results (t Test) (II)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	661.043	296.552		2.229	0.029
	Intellectual Capital	47.166	10.557	0.461	4.468	0.000
	ROE	4.069	6.517	0.063	0.624	0.534
	DER	-1.301	0.553	-0.259	-2.353	0.021
	Firm Size	-2.046	11.943	-0.019	-0.171	0.864
a. Dependent Variable: Firm Value						

Source: Processed Data, 2026

Based on Table 18 and a critical t-value of 1.653, the t-test results can be summarized as follows:

- 1) Intellectual Capital had a regression coefficient of 47.166, a t-value of 4.468, and a significance value of $0.000 < 0.05$. These results indicate that Intellectual Capital has a significant effect on Firm Value through Firm Size as an intervening variable.
- 2) Return on Equity (ROE) had a regression coefficient of 4.069, a t-value of 0.624, and a significance value of $0.534 > 0.05$. Thus, ROE does not have a significant effect on Firm Value through Firm Size as an intervening variable.
- 3) Debt-to-Equity Ratio (DER) had a regression coefficient of -1.301, a t-value of -2.353, and a significance value of $0.021 < 0.05$. These results indicate that DER has a significant effect on Firm Value through Firm Size as an intervening variable.
- 4) Firm Size had a regression coefficient of -2.046, a t-value of -0.171, and a significance value of $0.864 > 0.05$. Thus, Firm Size does not have a significant effect on Firm Value.

DISCUSSION

The Effect of Intellectual Capital on Firm Size

Intellectual Capital had a positive and significant effect on Firm Size, with a coefficient of 0.208 and a significance value of 0.042. This finding indicates that a company's ability to manage knowledge, human resource competencies, and organizational systems can support an increase in corporate scale. In infrastructure companies, managing complex assets and projects requires adequate human resources and work systems. This finding supports the resource-based view, which explains that effectively managed internal resources can contribute to corporate development (Barney, 1991). It is also consistent with Fitriani, Suriyanti, and Ramashar (2022), who demonstrated that Intellectual Capital plays an important role in supporting corporate performance and development.

The Effect of Return on Equity on Firm Size

Return on Equity did not have a significant effect on Firm Size, with a significance value of 0.779. This result indicates that the level of profit generated from shareholders' equity did not explain the increase in a company's total assets. In the infrastructure sector, asset growth is more closely associated with investment requirements and long-term project financing. Profit is not necessarily used to acquire additional assets because it may be allocated to operating activities, liability payments, or dividend distributions. Therefore, an increase in ROE is not necessarily accompanied by an increase in Firm Size.

The Effect of Debt-to-Equity Ratio on Firm Size

The Debt-to-Equity Ratio had a positive and significant effect on Firm Size, with a coefficient of 0.018 and a significance value of 0.000. This finding indicates that debt financing can support companies in purchasing assets and implementing projects. This condition is consistent with the characteristics of infrastructure companies, which require substantial funding and cannot always rely on internal equity. Nevertheless, the use of debt must remain controlled because asset growth is also accompanied by increased liabilities and financial risk. This finding is consistent with trade-off theory, which explains that debt provides financing benefits while also creating a risk of financial distress (Myers, 1984).

The Effect of Intellectual Capital on Firm Value

Intellectual Capital had a positive and significant effect on Firm Value, with a coefficient of 47.166 and a significance value of 0.000. This finding indicates that the market assigns a favorable valuation to companies that effectively manage knowledge, human resources, and organizational systems. Effective Intellectual Capital management can improve efficiency and strengthen a company's capacity to create value. This finding supports signaling theory because the ability to manage intellectual resources can convey positive information about corporate quality and prospects to investors (Ross, 1977). The result is consistent with Wulandari and Purbawati (2021) and Rahmadi and Mutasowifin (2021), who demonstrated that Intellectual Capital significantly affects Firm Value.

The Effect of Return on Equity on Firm Value

Return on Equity did not have a significant effect on Firm Value, with a significance value of 0.534. This finding indicates that the return generated from shareholders' equity was not a primary factor in investors' assessments of infrastructure companies. Investors consider not only profitability but also earnings sustainability, corporate risk, investment requirements, and financing structure. This finding differs from that of Lestari, Anggraeni, and Octavia (2023), who found that Return on Equity affected Firm Value. The difference may be attributable to variations in sector, research period, and the characteristics of the companies analyzed.

The Effect of Debt-to-Equity Ratio on Firm Value

The Debt-to-Equity Ratio had a negative and significant effect on Firm Value, with a coefficient of -1.301 and a significance value of 0.021. This finding indicates that an increase in the proportion of debt can reduce investors' valuation because it increases interest expenses and corporate financial risk. Although debt may be used to acquire additional assets, a high debt level can raise concerns regarding the company's ability to meet its obligations. This result is consistent with Karyatun and Ardhana (2022), who found a negative relationship between DER and Firm Value. It also supports Irnawati, Febriana, and Asmita (2022), who demonstrated that DER significantly affects Firm Value.

The Effect of Firm Size on Firm Value

Firm Size did not have a significant effect on Firm Value, with a significance value of 0.864. This finding indicates that a large amount of total assets does not necessarily increase market valuation. Investors consider not only the quantity of assets but also the company's ability to use those assets to generate profit and cash flow. Accordingly, a company with substantial assets does not necessarily have a high Firm Value when those assets have not been managed effectively. This result differs from that of Nurmansyah, Kristianto, and Saraswati (2023), who found that Firm Size affected Firm Value. The difference may be attributable to variations in sector and sample characteristics.

The Mediating Role of Firm Size in the Effect of Intellectual Capital on Firm Value

Intellectual Capital had a significant effect on both Firm Size and Firm Value. However, Firm Size did not have a significant effect on Firm Value. Therefore, Firm Size did not mediate the effect of Intellectual Capital on Firm Value. This indicates that the contribution of Intellectual Capital to Firm Value is more likely to occur directly through the company's ability to manage knowledge, human resources, and organizational capabilities rather than through an increase in corporate assets. In infrastructure companies, a larger asset base does not automatically create higher market value if those assets are not supported by efficient resource management and strong organizational capabilities. Thus, the effect of Intellectual Capital on Firm Value was more evident through the direct path than through changes in Firm Size. This finding differs from Radliyah (2025), although that study positioned Firm Size as a moderating variable and examined a different research object.

The Mediating Role of Firm Size in the Effect of Return on Equity on Firm Value

Return on Equity did not have a significant effect on either Firm Size or Firm Value. Firm Size also did not have a significant effect on Firm Value. Therefore, Firm Size did not mediate the effect of ROE on Firm Value. This finding indicates that a higher return generated from shareholders' equity was not necessarily followed by an expansion in corporate assets or an increase in market valuation. In infrastructure companies, profits may be allocated to operational needs, debt payments, or other financial commitments rather than directly used to expand the asset base. As a result, changes in ROE were not shown to influence Firm Value through changes in Firm Size.

The Mediating Role of Firm Size in the Effect of Debt-to-Equity Ratio on Firm Value

The Debt-to-Equity Ratio had a significant effect on both Firm Size and Firm Value. However, Firm Size did not have a significant effect on Firm Value. Therefore, Firm Size did not mediate the effect of DER on Firm Value. This result shows that debt can support the expansion of corporate assets, particularly in infrastructure companies that require substantial funding for long-term projects and asset acquisition. However, the increase in assets generated

through debt financing does not necessarily improve market valuation. Investors may still consider the financial risks associated with higher debt levels, including interest expenses and repayment obligations. Therefore, the effect of DER on Firm Value was more evident through the direct path, in which higher debt could reduce Firm Value even when it contributed to an increase in corporate assets.

CONCLUSION AND RECOMMENDATIONS

The findings show that Intellectual Capital and Debt-to-Equity Ratio play important roles in explaining differences in Firm Size, while Return on Equity does not appear to determine the scale of infrastructure companies. In relation to Firm Value, Intellectual Capital contributes positively to market valuation, whereas a higher Debt-to-Equity Ratio is associated with lower Firm Value. Return on Equity and Firm Size were not found to have significant effects on Firm Value. Firm Size also did not mediate the effects of Intellectual Capital, Return on Equity, or Debt-to-Equity Ratio on Firm Value, indicating that the influence of Intellectual Capital and financing structure is more evident through their direct relationships with Firm Value rather than through changes in corporate scale.

These findings imply that infrastructure companies should strengthen the management of intellectual resources, particularly employee capabilities, organizational knowledge, and internal systems that support value creation. Companies should also manage their debt structure more carefully because excessive reliance on debt may increase financial risk and weaken market valuation. Asset expansion should therefore be accompanied by effective resource utilization so that growth in company size can contribute to stronger corporate performance and value creation rather than merely increasing the scale of operations.

This study is limited to infrastructure companies listed on the Indonesia Stock Exchange and focuses on Intellectual Capital, Return on Equity, Debt-to-Equity Ratio, and Firm Size in explaining Firm Value. Future studies are recommended to extend the observation period, include companies from other sectors, and consider additional variables such as corporate growth, liquidity, dividend policy, corporate risk, and corporate governance to provide a broader understanding of the factors affecting Firm Value.

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