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The Effect of Intellectual Capital on Profitability with Firm Size as a Moderating Variable in Manufacturing Companies Listed on the Indonesia Stock Exchange (IDX) for the Period 2021–2023

Endah Tri Ningsih[1]*, Eni Wuryani[2]
Universitas Negeri Surabaya
Corresponding Author: Endah Tri Ningsih endah.21032@mhs.unesa.ac.id

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A B S T R A C T

This study examines the influence of intellectual capital on profitability with firm size as a moderating variable in manufacturing companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2023 period. Return on assets (ROA) is used as a proxy for profitability, the VAIC™ model is used to assess intellectual capital, and total assets are used to measure business size. Moderated Regression Analysis (MRA) was utilized to analyze the 359 data samples used in this study. The results show that Intellectual Capital has a significant positive effect on profitability. Firm size is proven to negatively moderate this effect, indicating that the positive impact of intellectual capital on profitability tends to weaken in larger-scale companies.

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INTRODUCTION

Intense rivalry in the labor market and an increasing need for top talent to gain a competitive edge characterizing the modern industrial landscape. Companies and employees alike must adjust to changing business demands, and employees must constantly enhance their competencies, according to the Ministry of Manpower's 2023 Labor Market Analysis Report. Companies must now proactively manage intellectual capital, such as human capital, structural capital, and capital employed, in order to boost productivity, innovation, and competitiveness. They can no longer rely only on physical assets. Companies that manage their intellectual capital well are better able to adapt to changes in the market and maintain long-term success.

The significance of internal resources as key determinants of organizational performance is emphasized by the Resource-Based View (RBV) theory. According to RBV, distinctive assets and capabilities like technology, expertise, and skills that are hard to replicate provide an organization a competitive edge (Barney, 1991). Value Added Human Capital (VAHU), Value Added Capital Employed (VACA), and Structural Capital Value Added (STVA) are the three primary components of the Value Added Intellectual Coefficient (VAIC™), a well-known model for calculating IC that was first presented by Pulic (1997). Manufacturing firms' profitability is greatly increased by intellectual capital (Cahyani et al., 2015).

Firm size is frequently linked to profitability, which measures a company's ability to generate earnings (Santoso & Handayani, 2021). The efficient use of intellectual capital is made possible by the resources that larger businesses typically have better access to, such as cutting-edge technology, highly qualified staff, and organizational infrastructure. In contrast to smaller businesses that may experience resource limitations, this allows them to convert IC into better profitability levels. Therefore, based on a company's ability to use its intellectual assets, firm size is projected to moderate the relationship between intellectual capital and profitability.

According to the above description, this study aims to investigate how intellectual capital affects profitability in manufacturing companies listed on the Indonesia Stock Exchange (IDX) the role of firm size as a moderating variable in the influence of intellectual capital and profitability in manufacturing companies listed on the Indonesia Stock Exchange (IDX).

LITERATURE REVIEW

Resource Based View (RBV) theory

Wernerfelt (1984) first proposed the Resource-Based View (RBV) theory, which Barney (1991) later codified and popularised. It describes organizational resources and how the corporate entity might benefit from them. To obtain and maintain a competitive edge, a company needs to have internal resources that are valuable, rare, inimitable, and non-substitutable (VRIN), according to the Resource-Based View (RBV) theory. A company's competitive advantage over rivals can be strengthened through the use of intellectual capital (Barney, 1991). According to the principle described above, an organization can use intellectual capital to gain a competitive edge or maintain performance over time.

Intellectual capital

A business entity's non-physical assets, or intellectual capital, are a collection of knowledge that can assist the successful implementation of a strategy and have an impact on the organization's competitive advantage and sustainability (Rezki, 2018). The VAIC model, a method made popular by Pulic (2000), will be used in this study to measure intellectual capital. Human capital, structural capital, and employed capital are the three fundamental components that make up intellectual capital (Pulic, 2000).

Profitability

The ability of a business entity to turn a profit is shown by its profitability, which can be calculated using total assets, total capital, or total purchases. High profitability can attract more investors and show that the company is operating at its best (Nur Aulia et al., 2020). Return on Assets (ROA) serves as the study's indicator.

Firm Size

Firm size is an instrument that indicates the scale of a business entity. Total assets, sales volume, average sales, and average total assets can all be used to gauge a company's size (Wuryani, 2013). There is often a correlation between a company's size and profitability. Generally speaking, large businesses have a greater strategic advantage than smaller ones. This strength can include the capacity to lower costs through economies of scale and simpler access to funding. (Dang and others, 2018).

The Effect of Intellectual Capital on Profitability

Because it increases a company's efficiency, innovation, and competitive advantage, intellectual capital (IC) has an impact on profitability. Strong intellectual capital inside a business is linked to higher profitability and financial stability (Tsai et al., 2020). Businesses can improve their competitiveness and financial performance by producing substantial added value from existing structural assets through effective IC management (Naqshbandi et al., 2018). As a result, IC boosts the company's competitive position in the market and enhances internal performance, which eventually leads to higher profitability.

H1: Intellectual capital has a positive and significant effect on profitability.

Firm Size as a Moderator in the Relationship Between Intellectual Capital and Profitability

The relationship between profitability and intellectual capital (IC) is moderated by firm size. Larger companies typically produce more assets and are better able to efficiently manage and maximize their intellectual capital, both of which can increase profitability. Additionally, larger businesses typically encounter greater public demand, which makes it easier for them to develop by utilizing their resources. The profitability of a business may be significantly impacted by such innovation (Efrinal & Astuti, 2023).

H2: Firm size moderates the relationship between intellectual capital and profitability.

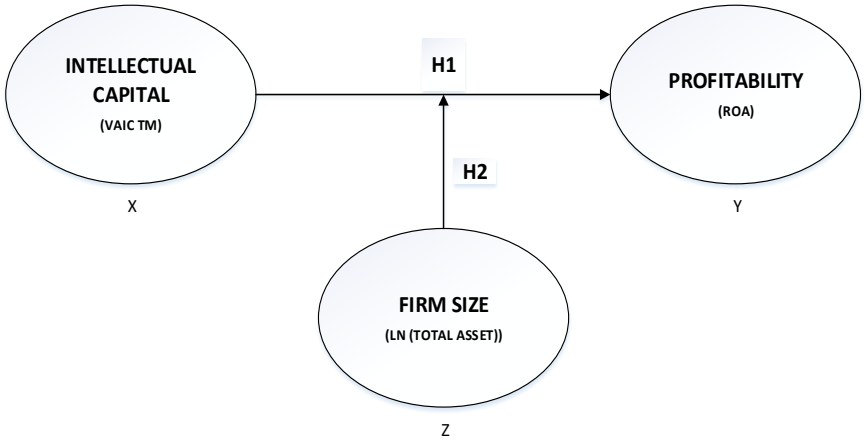

Figure 1. Conceptual Framework

METHODOLOGY

This study uses a quantitative methodology that includes hypothesis testing. The financial statements of manufacturing companies registered on the Indonesia Stock Exchange (IDX) (idx.co.id) for the years 2021–2023 are the specific secondary data used in this study. The main source of the variables used to support and complete the research are these financial statement. Purposive sampling was the approach used to acquire the data. 159 company's were chosen as appropriate samples from this approach, resulting in 477 observations over the course of three years. The independent variable in this study is intellectual capital, which is measured by VAIC; the dependent variable is profitability, which is measured by ROA (return on assets); and the moderating variable is firm size, which is measured by the natural logarithm of total assets.

RESEARCH RESULT

Descriptive Statistics

Table 1. Descriptive Statistics Result

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Intellectual Capital	477	-57,60	22,10	1,8896	5,11253
Profitabilitas	477	-,95	,94	,0369	,11517
Ukuran Perusahaan	477	24,65	33,73	28,1849	1,68181
Valid N (listwise)	477				

Source: IBM SPSS (Data processed, 2025)

According to the findings of the descriptive statistics, 477 data samples were used in this investigation. The profitability (ROA) mean was 0.0369 with a standard deviation of 0.11517, while the intellectual capital mean was 1.8896 with a standard deviation of 5.11253. With a standard deviation of 1.68181, the mean company size was 28.1849. Each variable's minimum and maximum values show how the data varies throughout the sample. The maximum value of intellectual capital was found to differ significantly, primarily as a result of variations in the

nominal amounts of total equity and personnel expenses. The reduced reported employee expenses in certain organizations were also caused by incomplete disclosure of employee expense components in financial statements, such as the absence of general administrative wages and pension costs.

Classical Assumption Test

Normality Test

Table 2. Normality Test 1 Result

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		477
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	,10510416
Most Extreme Differences	Absolute	,143
	Positive	,112
	Negative	-,143
Test Statistic		,143
Asymp. Sig. (2-tailed)		,000[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Source: IBM SPSS (Data processed, 2025)

An Asymp. Sig. result of 0.000 from the Kolmogorov-Smirnov test indicates that the residuals are not normally distributed. In order to improve the data's normalcy, z-score analysis was used to remove outliers and perform data transformation (sqrt) (Ghozali, 2018:34).

Table 3. Normality Test 2 Result

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		359
Normal Parameters[a,b]	Mean	-,0000251
	Std. Deviation	,09225957
Most Extreme Differences	Absolute	,043
	Positive	,042
	Negative	-,043
Test Statistic		,043
Asymp. Sig. (2-tailed)		,181[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Source: IBM SPSS (Data processed, 2025)

To get a normal distribution, 118 samples were removed following data processing and outlier elimination. consequently, 359 was the final sample size examined. Following adjustment, the Kolmogorov-Smirnov test yielded an Asymp. Sig. value of 0.181, above the 0.05 cutoff, indicating that the data is now normally distributed.

Multicollinearity test

Table 4. Multicollinearity Test Result

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Intellectual Capital	,914	1,094
	Ukuran Perusahaan	,914	1,094

a. Dependent Variable: Profitabilitas

Source: IBM SPSS (Data processed, 2025)

According to the study's findings, the VIF values for firm size and intellectual capital are 1.094 and 0.914, respectively. The regression model appears to be free of multicollinearity issues when the VIF values are less than 10 and the tolerance values are greater than 0.10.

Heteroscedasticity test

Table 5. Heteroscedasticity Test Result

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	,593	,311		1,904	,058
	Intellectual Capital	-,029	,032	-,051	-,920	,358
	Ukuran Perusahaan	-,201	,139	-,080	-1,441	,150

a. Dependent Variable: ABS_RES

Source: IBM SPSS (Data processed, 2025)

Firm size and intellectual capital have significance values of 0.150 and 0.358, respectively, both of which are higher than the 0.05 cutoff. This shows that the regression model's homoscedasticity assumption has been met.

Autocorrelation Test

Table 6. Autocorrelation Test Result

Runs Test

	Unstandardized Residual
Test Value[a]	,03045
Cases < Test Value	179
Cases >= Test Value	180
Total Cases	359
Number of Runs	176
Z	-,476
Asymp. Sig. (2-tailed)	,634

a. Median

Source: IBM SPSS (Data processed, 2025)

According to the study, the Asymp. Sig. value is 0.634, above the 0.05 cutoff, indicating that the residuals have a random pattern and that there are no indications of autocorrelation in the regression model.

Multiple Linear Regression Test

Table 7. Multiple Linear Regression Test Result

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error
1	(Constant)	-,548	,057
	Intellectual Capital	,789	,045

a. Dependent Variable: Profitabilitas

Source: IBM SPSS (Data processed, 2025)

From the results, the regression equation model can be formulated as:

ROA = -0,548+0,789IC+e

The constant value shows that Return on Assets (ROA) tends to be negative at -0.548 when intellectual capital (IC) is zero, indicating that the company is likely to experience low or even negative profitability in the absence of intellectual capital. A one-unit increase in intellectual capital (IC) results in a 0.789 rise in profitability, according to the positive coefficient of 0.789.

Hypothesis Testing

Coefficient of Determination (Adjusted R²)

Table 8. Coefficient of Determination (Adjusted R²) Result

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,682[a]	,466	,464	,12680

a. Predictors: (Constant), Intellectual Capital

Source: IBM SPSS (Data processed, 2025)

With an Adjusted R Square value of 0.464, the independent factors account for 46.4% of the variation in profitability, with other variables outside the scope of this study determining the remaining variation.

T-Test

Table 9. T-Test Result

Coefficients[a]

Model		t	Sig.
1	(Constant)	-9,591	,000
	Intellectual Capital	17,634	,000

a. Dependent Variable: Profitabilitas

Source: IBM SPSS (Data processed, 2025)

Table 9's findings show that profitability is significantly impacted by intellectual capital. The t-value of 17.634 at a probability level of 0.000, which is less than the 0.05 significance level, indicates this. Better management of

intellectual assets results in higher corporate profitability, according to the positive coefficient on the intellectual capital variable.

Moderated Regression Analysis Test (MRA)

Table 10. Moderated Regression Analysis Test Result

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error
1	(Constant)	-16,540	3,970
	Intellectual Capital	13,055	3,139
	Ukuran Perusahaan	6,948	1,723
	IC*Ukuran Perusahaan	-5,326	1,361

a. Dependent Variable: Profitabilitas

Source: IBM SPSS (Data processed, 2025)

Based on the output, the regression equation model can be formulated as:

ROA = -16,540+13,055IC+6,948FS-5,326ICFS+e

According to the regression results, ROA is positively impacted by both firm size (FS) and intellectual capital (IC), with FS contributing 6,948 and IC 13,055. The interaction term of -5.326, however, suggests that the beneficial effect of IC on profitability is reduced with increasing business size. In the absence of these factors, ROA often declines dramatically to -16,540.

Hypothesis Testing (MRA)

Coefficient of Determination (Adjusted R^2) (MRA)

Table 11. Coefficient of Determination (Adjusted R^2) Result (MRA)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,700[a]	,490	,485	,12424

a. Predictors: (Constant), IC*Ukuran Perusahaan, Ukuran Perusahaan, Intellectual Capital

Source: IBM SPSS (Data processed, 2025)

The model's Adjusted R Square value rises to 0.485, meaning that the independent variables in this moderation model account for 48.5% of the variation in profitability.

T-Test (MRA)

Table 12. T-Test Result (MRA)

Coefficients[a]

Model		t	Sig.
1	(Constant)	-4,166	,000
	Intellectual Capital	4,159	,000
	Ukuran Perusahaan	4,032	,000
	IC*Ukuran Perusahaan	-3,913	,000

a. Dependent Variable: Profitabilitas

Source: IBM SPSS (Data processed, 2025)

A significant negative moderating effect is indicated by the interaction between intellectual capital and firm size, which has a t-value of -3.913 with a significance level of 0.000. This indicates that the beneficial impact of intellectual capital decreases as firm size increases.

DISCUSSION

The Effect of Intellectual Capital on Company Profitability

According to the partial t-test results, profitability is positively and significantly impacted by intellectual capital, meaning that improved profitability is a direct result of increased intellectual capital. According to this, companies that successfully manage their intellectual property are better equipped to maximize operational effectiveness, promote innovation, and increase competitiveness all of which eventually result in higher profitability. The study's findings are in line with those of Intan Cahyani et al. (2015), who discovered that intellectual capital significantly and favorably affects a business's profitability. Accordingly, intellectual capital is regarded as an intangible asset that can provide a long-term competitive advantage in the RBV framework. As a result, businesses with strong intellectual capital management skills have a higher chance of outperforming their rivals in terms of profitability.

The Role of Firm Size in Moderating the Relationship Between Intellectual Capital and Profitability

Firm size effectively moderates the relationship between profitability and intellectual capital in a negative direction, according to the results of the moderated regression analysis. Strict bureaucratic procedures and intricate organizational structures are common in large businesses, which can hinder decision-making and reduce responsiveness to intellectual capital-driven innovation. The importance of tangible assets, economies of scale, and established system efficiencies can eclipse the role of intellectual capital in these kinds of organizations. In other words, because its influence is distributed among other, more significant elements, the contribution of intellectual capital to profitability is typically less obvious. Additionally, big businesses often have trouble coordinating their vision and workplace culture across many divisions, which can impede the full application of knowledge and innovation. Small and medium-sized businesses, on the other hand, are typically more adaptable and flexible to change. To remain competitive, these companies typically rely more

on the skills of their people resources. Because decisions can be made swiftly and creative ideas may be put into action right away, intellectual capital has a greater potential to immediately contribute to profitability in this situation. This result is consistent with a study by Kurniawan & Muharam (2021) that found that firm size negatively moderates relationship between intellectual capital and profitability (ROA), larger companies might not make as much investment in intangible assets like intellectual capital, intellectual capital in larger companies does not always have greater effects than in smaller corporate units.

CONCLUSIONS AND RECOMMENDATIONS

This study highlights intellectual capital's significance as a strategic resource in accordance with the Resource-Based View (RBV) theory, concluding that it has a positive and significant impact on company profitability. However, negatively moderated by firm size, indicating that the advantages of intellectual capital are less noticeable in larger businesses. Therefore, even though their organizations are more complicated, larger corporations should manage their intellectual capital more effectively to continue increasing revenues.

ADVANCED RESEARCH

The limitations of this study include the focus on only a few variables, namely intellectual capital and Firm Size, which may not encompass all factors affecting profitability. Future research could consider adding other variables, such as capital structure, managerial quality, or external factors like market conditions and global economics, to provide a more comprehensive picture. Additionally, this study is limited to a specific sample and time period, so research with a larger sample and longer data span could strengthen the findings.

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