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The effect of intellectual capital and financial performance on firm value in manufacturing companies

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ABSTRACT

The objective of this research is to analyse the effect of intellectual capital and financial performance on firm value, with the analysis testing multiple linear regression with SPSS Version 26 software. The data utilised in this study are audited financial statements for companies in the manufacturing sector that were listed on the Indonesia Stock Exchange (IDX) during 2020-2023. The study utilised a sample of 72 manufacturing companies listed on the IDX during the 2020-2023 period, employing a purposive sampling technique. The results of the study determined by the t-test output using SPSS show that the intellectual capital variable partially affects the company's value. Partially, financial performance has no significant effect on firm value. The results of the F test show that intellectual capital and financial performance simultaneously have a significant effect on firm value in the manufacturing sector listed on the Indonesia Stock Exchange in 2020-2023.

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1. Introduction

The manufacturing sector plays a strategic role in a country's economy, especially in developing countries such as Indonesia. This sector is not only a major contributor to the formation of Gross Domestic Product (GDP), but also as a driver of industrialisation, labour absorber, and investment driver. In facing global competition, manufacturing companies are required to optimise their resources, including intellectual capital, to increase innovation and operational efficiency. Intellectual capital plays an important role in improving the competitiveness of manufacturing companies, especially in the context of technology adoption, knowledge management, and product innovation. In this case, intellectual capital becomes a key factor that affects not only financial performance, but also overall firm value. The capital-intensive, labour-intensive, and efficiency-oriented characteristics of the manufacturing sector make the relationship between intellectual capital, financial performance, and firm value more relevant to study.

However, in a more dynamic environment, the complexity of the situation necessitates a comprehensive understanding of the drivers of firm value. Intellectual capital and financial performance emerge as critical factors in determining firm value. Among these drivers, intellectual capital is a crucial element in achieving competitive advantage and enhancing firm value. Human capital, structural capital, and relational capital are integral components of not just intellectual capital but also serve as a central strategy to improve operational efficiency and develop sustainable value.With respect to the concept of intellectual capital, it is a focused asset, which is inclusive of labour resources, organisational wisdom, and external relationships to generate added value and competitive edge (Al-Qudah, A. M., Badawi, A. A., & Al-Dhwaitat, 2022).

The term 'intellectual capital system' refers to those intangible assets that can aggregate for an organisation and provide a holistic measure of intellectual capital that can ultimately contribute to value creation in the enterprise (Martins & Lopes, 2024). This encompasses knowledge, skills, and relationships that are the foundations of innovation and competitive advantage. Financial performance is defined as a company's ability to generate profit through its operations and reduce the use of its financial resources, operational effectiveness, and to meet obligations to its stakeholders. This is usually expressed in financial performance indicators, including profitability, liquidity, and efficiency of assets (Brigham, 2022). Performance is an evaluation of a business's ability to earn profit and efficiently manage its financial resources. The financial performance indicated by ROA, ROE, and other such measures show the firm's operational effectiveness alongside its profits, which also contribute to the increase in firm value (Sugiyono, 2016). The firm value itself is the interaction between the financial and non-financial performance, which reflects the market's response to the sustainability of the company's assets. Given that firm value is equivalent to the market value of outstanding debt and equity securities, investors' perceptions of a firm's success and future prospects are the primary determinants of its value in the market.Firm value is a multifaceted and pivotal concept for stakeholders, as it can influence investment decisions and management behaviour (Tarczynski et al., 2020). The value of these firms, frequently articulated through PBV, reflects market perceptions regarding their growth and sustainability. Investors utilise this indicator to evaluate the attractiveness of the Company and it serves as an essential point of reference. The results found that intellectual capital has a significant influence on firm value (Fitriyana, 2024). However, despite the extensive research on the effects of intellectual capital and financial performance on firm value, the findings remain inconclusive. Chen et al., (2005) have demonstrated that intellectual capital exerts a substantial influence in the high-tech industry. However, as Al-Qudah, A. M., Badawi, A. A., & Al-Dhwaitat, (2022) have highlighted, there remain unexplored areas in the intellectual capital and firm value link. Specifically, they demonstrate that the impact of intellectual capital on firm value can be moderated by contextual factors, such as macroeconomic conditions and specific industry groupings.

Financial performance is not always the main indicator in increasing firm value in the manufacturing sector. A firm's capital structure also plays an important role in determining firm value. An optimal capital structure, which is the right combination of debt and equity funding, can increase firm value. Growth factors also have a significant effect on firm value. Companies with high growth rates, both in assets, sales, and profits, tend to have higher firm values. External factors such as macroeconomic conditions, government policies, industry competition, and market dynamics can have a large impact on firm value, even exceeding the impact of the company's financial performance itself. Aspects such as product innovation, management quality, brand reputation, customer satisfaction, and long-term growth prospects can be more dominant investor considerations compared to current financial performance. Ownership structure and corporate governance also play an important role in influencing firm value. Managerial ownership, ownership concentration, and board quality can be more dominant determinants than financial performance alone.

In Indonesia, however, research on intellectual capital remains limited, particularly within the industry manufacturing sector. Typically, local research focuses more on services or technology-driven companies. Nevertheless, empirical studies examining the simultaneous impact of intellectual capital and corporate performance on firm value, particularly in the manufacturing sector, are scarce. This critical research area is especially important in light of the manufacturing sector's pivotal role in the national economy. The present study aims to address this research gap by examining the impact of intellectual capital (using *VAIC)* and financial performance (using ROA) on firm value (PBV) in a sample of manufacturing companies listed on the IDX for the time frame 2020–2023.

2. Research Method

This study employs a quantitative, statistical framework, utilising secondary data from financial reports obtained from www.idx.co.id. The statistical analysis performed is multiple linear regression analysis using SPSS (Statistical Product and Service Solution) software version 26. Multiple linear regression can be used to analyse the simultaneous relationship between intellectual capital and financial performance on firm value. This method allows researchers to determine the effect of several independent variables (intellectual capital and financial performance) together on the dependent variable (firm value). From the regression results, we can see: the coefficient of determination (R-squared) which shows how large a proportion of the variation in firm value can be explained by intellectual capital and financial performance together. The value of the regression coefficient (X1 and X2) which shows the magnitude of the influence of each independent variable

on the dependent variable. The significance of the effect of each independent variable on the dependent variable, which can be seen from the p-value or t-statistic value. The population of this research consists of Manufacturing companies listed on the Indonesian Stock Exchange for the period 2020 to 2023. The purposive sampling technique was employed to select the sample. The data were analysed using a variety of statistical tests, including the classical assumption test, hypothesis testing, and the determination of the coefficient (R^2).

Mediating or moderating variables in analysing the relationship between variables is an important consideration in research. Mediating variables are variables that mediate or explain the relationship between the independent variable and the dependent variable. Moderating variables are variables that strengthen or weaken the relationship between the independent variable and the dependent variable. The decision to include mediating or moderating variables should be based on a strong theoretical framework and clear hypotheses. Appropriate statistical analyses are also required to accurately test mediation and moderation effects. However, the limitation of this study is to analyse the effect of intellectual capital and financial performance on firm value, using multiple linear regression analysis. By using multiple linear regression, researchers can comprehensively analyse how intellectual capital and financial performance simultaneously affect firm value.

Dependent Variable

Value of proxy firm value (PBV) PBV indicates the proportion of the companys market value versus the book value of its assets. It represents the investor's view on the company's growth opportunity (Damodaran, 2012). PBV provides insight into how the market is valuing an entity's assets against their reported book value. PBV Formula:

$$PBV = \frac{Market\ price\ per\ share}{Book\ Value\ per\ share}$$

Independent Variable

VAIC value is used as a proxy for intellectual capital. *VAIC* is used to determine how well the company converts intellectual capital and other assets into added value (Tan et al., 2007). VAIC used to measure the effectiveness of the intellectual capital of the company, including the effectiveness of the invested capital (VACA), human capital (VAHU), structural capital (STVA). *VAIC* Formula:

$$VAIC = VACA + VAHU + STV\,A$$

VAIC Components:

1. Value Added Capital Employed (VACA): Capital efficiency invested

$$VACA = \frac{\text{Value Added (VA)}}{\text{Capital Employed(CE)}}$$

2. Value Added Human Capital (VAHU): Efficiency of human capital

$$VAHU = \frac{\text{Value Added (VA)}}{\text{Human Capital (HC)}}$$

3. Structural Capital Value Added (STVA): Structural Capital Contribution

$$STV\ A = \frac{\text{Structural Capital (SC)}}{\text{Value Added (VA)}}$$

Financial Performance proxied by ROA value Return on Assets (ROA): This examines how profitable a company is in relation to its total assets that are used. Brigham, (2022) ROA offers a bird-eye view on the entitys ability to yield returns from all of its assets. ROA Formula:

$$ROA = \frac{\text{Net Profit}}{\text{Total Assets}}$$

3. Result and Discussion

The results of sample selection based on predetermined criteria can be seen in the table below:

Table 1. Sampling process

Description	Total
Population: Manufacturing companies listed on the IDX.	220
Sampling based on criteria (purposive sampling):	
1. Companies that are not listed on the IDX consecutively from 2020-2023	-27
2. Companies that do not report financial statements for the period 2020-2023	-21
3. Companies that do not use IDR currency	-29
4. Companies that are not profitable	-71
Research Sample	72
Total Sample (n x research period) (72 x 4 years)	288

The population of this study is non-financial companies listed on the Indonesia Stock Exchange (IDX) in 2020-2023. The analyzed sample is determined according to some predefined criteria, and 72 companies have been sampled for each year, resulting in 288 samples from 2020 to 2023.

Table 2. Descriptive statistics test

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Intellectual Capital (X1)	282	.39878	6.41156	3.1887220	.73478591
Financial Performance (X2)	282	.00200	8.25623	8.2191466	.49158259
Firm Value (Y)	282	-.52086	1.67030	.4025801	.38774639
Valid N (listwise)	282				

Referring back to Table 1, the minimum value of X1 is 0.398 and the maximum value of X1 is 6.411. The mean of X1 is 3.188, with a standard deviation of 0.734. The maximum value for X2 is 8.256, while the minimum value for X2 is 0.002. The average value for X2 is 8.219 (SD = 49). The minimum value for Y is -0.526, and the maximum value for Y is 1.67. The mean of Y is 0.402, with a standard deviation of 0.387.

Classical Assumption Test

Statistical Tests of Assumptions

The classical assumption tests are a set of statistical tests conducted prior to analysis using multiple linear regression in order to confirm that the sample analysed is uncontaminated by confounding factors (Alita et al., 2021). The test consists of the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test, which are classic assumption tests in this study.

Normality Test

In this study, Kologorov-Smirnov test was employed to assess normality of the residuals. (α = 0.05) Then the part of consider is probability number p; Which condition as follows (Ghozali Imam, 2013).

Table 3. Kolmogorov-smirnov test

Description		Unstandardized Residual
N		282
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.03405647
Most Extreme Differences	Absolute	.047
	Positive	.043
	Negative	-.047
Test Statistic		.047
Asymp. Sig. (2-tailed)		.200[c,d]
Exact Sig. (2-tailed)		.543
Point Probability		.000

From the table we could see value for the probability, Asymp. Sig (2-tailed) is 0.200. The probability value of 0.200 is higher than the significance level of 0.05; hence the normality assumption holds.

Multicollinearity Test

To examine the presence of multicollinearity or absence of it from the variance inflation factor (VIF) value. A VIF > 10 means that independent variable has multicollinearity.

Table 4. Multicollinearity test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Intellectual Capital (X1)	.995	1.005
	Financial Performance (X2)	.995	1.005

a. Dependent Variable: Firm Value (Y)

It has been established that the VIF value of Intelectual Capital (X1) is 1.005, and that the VIF value of Financial Performance is also 1.005. It is evident that all VIF values are less than 10, thus indicating that there is an absence of multicollinearity.

Heteroscedasticity Test

Glejser test can be used to detect the absence or presence of heteroscedasticity (Ilori & Tanimowo, 2022).

Table 5. Heteroscedasticity test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.027	.672		.040	.968
	Intellectual Capital (X1)	.021	.054	.023	.383	.702
	Financial Performance (X2)	.085	.080	.064	1.061	.290

a. Dependent Variable: abs_res

As demonstrated in the Glejser test output, the BLUE constants for the test of independence in Part 2 are significant at the 0.05 level for the regression, thereby validating the null hypothesis. This hypothesis stipulates that the coefficients of each independent variable are statistically insignificant, with a p-value greater than 0.05. This outcome indicates the absence of heteroscedasticity.

Autocorrelation Test

In this study, the autocorrelation test was used along with Durbin–Watson test. Based on the results of the Durbin Watson test

Table 6. Durbin-watson test

Model Summary[b]	
Model	Durbin-Watson
1	1.811

A Durbin-Watson statistic less than 1 or greater than 3 indicates autocorrelation. According to the table the value of Durbin-Watson is 1.811. Note that since Durbin-Watson statistic value range is between 1 and 3, ie 1 <1.811 <3, this reaffirms assumption non autocorrelation, in other words there is no symptom of autocorrelation.

Multiple Regression Test

Table 7. Multiple linear regression results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.656	.317		5.231	.000		
	Intellectual Capital (X1)	-.314	.025	-.596	-12.411	.000	.995	1.005
	Financial Performance (X2)	-.030	.038	-.039	-.805	.422	.995	1.005

a. Dependent Variable: Firm Value (Y)

From the table, the multiple linear regression equation could be derived as:

Y = 1.656 - 314 X1 - 0.030 X2 + e

Considering this equation, it is interpreted in a way:

The value of the constant is known to be 1.656, and if X1 and X2 have no impact on Y, this value can be interpreted as the dependent variable Y becomes 1.656. It is known that the negative regression coefficient value of the variable X1 is 0.314, meaning that for every 1 unit increase in X1, Y decreases by 0.314 on average. The regression coefficient value of X2 is known to be 0, and the value of X2 is ≤0. Therefore, an increase in X2 by one unit will likely result in a decrease in Y by 0.030.

Hypothesis testing:

Simultaneous Significance Test (F Test)

The F test is used to assess the joint or simultaneous effect of the independent variables on independent variable y.

Table 8. Simultaneous effect test with f test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.206	2	7.603	78.441	.000[b]
	Residuals	27.042	279	.097		
	Total	42.248	281			

a. Dependent Variable: Firm Value (Y)

b. Predictors: (Constant), Financial Performance (X2), Intellectual Capital (X1)

Refering to the table, F-count = 78.44 and p-value = 0.00. F the table of values is 78.44> 3.02 and Sig value. It is On the other hand, If 0.00 <0.05 Or 04, simultaneously or together X1 and X2 affect Y.

Partial Effect Significance Test (t Test)

Table 9. Partial effect test with t test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.656	.317		5.231	.000		
	Intellectual Capital (X1)	-.314	.025	-.596	-12.411	.000	.995	1.005
	Financial Performance (X2)	-.030	.038	-.039	-.805	.422	.995	1.005

a. Dependent Variable: Firm Value (Y)

From the above table we know that Sig. Sig. value obtained is 0.00, which is < from the alpha 0.05, then X1 has a significant effect on Y. 2 with the results table value 0.42 < significance level 0.05.X2 has an insignificant effect on Y.

Determination Coefficient Test

Table 10. Test of Determination Coefficient

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.600[a]	.360	.355	.31132684	1.811

a. Predictors: (Constant), Financial Performance (X2), Intellectual Capital (X1)

b. Dependent Variable: Firm Value (Y)

Thus the coeffcients must be done to determine to what extent does the independent variable influence the dependent variables. The use of the coefficient of determination test can be seen from the value of R Square in the table above. Coefficient of determination: The higher the coefficient of determination, the more dependent variable is affected by the independent variable.

Therefore, the coefficients must be used to determine the extent to which the independent variable influences the dependent variables. The use of the coefficient of determination test can be seen from the value of R-squared in the table above. Coefficient of determination: The higher the coefficient of determination, the more the dependent variable is influenced by the independent variable.

In the validation test results above, the coefficient of determination (R-square) is 0.360. Thus, 36% of the variance in the ability of the independent variables to affect the dependent variable is explained in the regression model in this study, while 64% is explained in the chronicled variables not included in this study

Intellectual Capital to Firm Value

One of the strategic assets that can create value for a company is intellectual capital. Therefore, after the effective management and use of intellectual resources, the value creation of the company takes place signed in the maximisation of the welfare for the shareholders. In this study, VAIC also measured intellectual capital, which proved to have an impact on firm value (PBV). This means the higher chance of being value in the market of companies with higher levels of intellectual capital, because managing their intellectual capital value in the market perception is more efficient than others. According to Ghosh, S. K., & Mondal, (2009) it is shown by the study that through appropriate management of intellectual capital it enhances the company's market perception and competitiveness. Research by Chen et al., (2005) they also proved that well-managed intellectual capital leads to higher market value of companies.

This result is in line with the research conducted by Indawati that intellectual capital has a significant effect on firm value simultaneously and partially as well as the research conducted by (Tubara et al., 2024) that intellectual capital has a significant effect on firm value. This is supported by the research of Ulum, I., Ghozali, I., & Chariri, (2021) who found that intellectual capital significantly affects firm value in Indonesian manufacturing firms. Other research found that there is no effect of intellectual capital on firm value (Widiyaningsih & Nugroho Jati, 2024) and (Smriti & Das, 2018).

Financial Performance on Firm Value

For example, how efficiently a company can use its resources to meet its economic objectives and make money is indicated by financial performance - a primary indicator of a company's financial success. In this study, financial performance, as measured by return on assets (ROA), had no significant effect on firm value (PBV). These results show that profit is not the only factor influencing market sentiment for manufacturing companies. ROA is a measure of how well a company uses its assets to generate profitability. A high ROA indicates that the company is managing its assets in the right way to generate profit.

This study is in line with the research conducted by Dewi & Tarnia, (2019), which shows that financial performance with proxies for return on assets (ROA) does not have a significant effect on firm value. The low impact of ROA on PBV suggests that profitability is not the only parameter considered by the investor, a manufacturing company. This can be explained by the nature of manufacturing, which tends to focus on value creation and operational efficiency rather than profit making. This finding is also consistent with the work of (Tan et al., 2007). This statement is based on (Husna & Satria, 2019) and (Jihadi et al., 2021). This study is contrary to (Farhatulmaula & Suparmin, 2024) who has researched that financial performance has an effect on firm value significant and also Al-Qudah, A. M., Badawi, A. A., & Al-Dhwaitat, (2022) that profitability determines the perception of developing countries companies in the market. However, this difference can be attributed to the characteristics of the Indonesian manufacturing sector, where non-financial aspects such as innovation and sustainability attract investors' interest.

The Effect of Intellectual Capital and Financial Performance on Firm Value

The findings of the F test demonstrate that the collective impact of intellectual capital and financial performance on firm value is statistically significant. These results are consistent with the research conducted by (Fitriyana, 2024), which determined that intellectual capital exerts a substantial effect on firm value, both in a simultaneous and a partial manner. Chen et al., (2005) posit that the integration of intellectual capital and financial resources can enhance a company's competitiveness and market value. However, in the context of the Indonesian manufacturing sector, the findings reveal that while the simultaneous effect is significant, each variable exerts a distinct impact on the value of the company. This observation aligns with the research conducted by (Sherlianti & Suhendro, 2023). The growth of intellectual capital, in conjunction with financial performance, exerts a simultaneous influence on each other in banking companies, since the enhancement of financial performance engenders a corresponding increase in firm value (Fristiani Nosilia, Ani Pangastuti Dyah, 2020).

4. Conclusion

The objective of this study is to analyse the impact of capital intellectual (Value Added Intellectual Coefficient [VAIC]) and financial performance (Return On Assets [ROA]) on firm value (PBV) in all

manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2023. The findings of this study demonstrate that the impact of Intellectual Capital (VAIC) and Intellectual Capital (ROA) on firm value is significant and simultaneous, indicating that the efficient management of intellectual capital contributes to enhancing the perception of the company in the community. Partially, intellectual capital exerts a significant effect on the value of the company, while financial performance has no effect on stock value. This suggests that company profitability alone is insufficient to increase the market value of manufacturing companies. The results contribute to extant literature by demonstrating that intellectual capital can enhance firm value, particularly within the competitive manufacturing sector where intellectual properties are considered a strategic asset. The research findings on the effect of intellectual capital and financial performance on firm value in the manufacturing sector can be applied to various other sectors, but need to pay attention to some specific characteristics of each sector. Intellectual capital consisting of human capital, structural capital, and relational capital is believed to play an important role in creating added value and competitive advantage for companies, not limited to the manufacturing sector. Technology companies often rely on innovation and new product development, which require high intellectual capabilities from their employees. The study's inherent limitations stem from its exclusive focus on the manufacturing sector, precluding the analysis of other sectors, such as services or technology, where distinct intellectual capital characteristics may emerge. The research model's restriction to intellectual capital and financial performance as independent variables underscores a key gap in the existing literature. In contrast to this study, numerous independent variables that can influence corporate performance, such as innovation, corporate governance, and sustainability, are not analysed. The study's findings offer a valuable insight into the role of intellectual capital in firm value creation in the manufacturing sector. The results of the research on the manufacturing sector cannot be directly generalised to other sectors without considering the distinctive sectoral characteristics. The influence of human capital may be more dominant in the service sector compared to the manufacturing sector. Therefore, more in-depth analyses and follow-up research on different sector contexts are needed to ensure the validity of the findings.

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