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EXPLORING THE IMPACT OF INTELLECTUAL CAPITAL AND FINANCIAL PERFORMANCE ON MANUFACTURING FIRM VALUE IN INDONESIA

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ABSTRACT

This study examines how intellectual capital and financial performance affect firm value in Indonesian manufacturing companies listed on IDX (2012-2016). Using path analysis on 35 observations from seven companies, we investigated causal relationships among variables. Results show intellectual capital does not significantly influence financial performance (ROE) or firm value (PBV). However, financial performance positively impacts firm value. Financial performance also does not mediate the intellectual capital-firm value relationship. These findings suggest investors should prioritize financial performance indicators in investment decisions, while intellectual capital's role may require alternative measurement approaches.

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1. INTRODUCTION

In the 21st century, the business world faces significant increased competition, driven by rapid developments in science and technology. In confronting this era of free competition, companies are required to possess competitive advantages to ensure their survival and growth. The increasing intensity of competition, coupled with information technology changes that are not only dynamic but also innovative, forces companies to revolutionize their operational methods. Efforts to continue surviving require companies to shift from labor-based business models to knowledge-based business models, making the main characteristic of companies as knowledge-based entities [1]. Knowledge-based economies tend to create value based on intangible assets and resources, compared to traditional tangible assets.

The implementation of knowledge-based business models changes the paradigm of corporate value creation. Company development now heavily depends on management's ability to manage company resources to create value. Firm value reflects the price that investors are willing to pay for a company, where high stock prices indicate high firm value. Maximizing firm value is crucial because it directly correlates with maximizing shareholder wealth, which is the primary objective of companies [2].

Based on resource-based theory, companies achieve competitive advantage through ownership of superior resources, both tangible and intangible assets. While tangible assets are easily identified in accounting balance sheets, measuring and identifying intangible assets, such as intellectual capital, presents challenges. Intellectual capital has become a focus of attention in various fields [3]. Intellectual capital components have evolved since the Skandia model was first introduced in 1991, consisting of four main elements: human capital, customer

capital, process capital, and renewal/development capital [4]. This model was later simplified to human capital, relational capital, and structural capital as the main parts of intellectual capital [5].

Ante Pulic introduced the Valu Added Intellectual Coefficient (VAIC) method in 1997 as a tool to measure intellectual capital [6]. VAIC analyzes value creation efficiency using data from organizational financial reports, measuring value creation efficiency from tangible assets (capital employed efficiency/CEE), human capital (human capital efficiency/HCE), and structural capital (structural capital value added/STVA) [7]. The concept of value added is considered an indicator of overall business success and demonstrates the company's ability to create value [8].

In Indonesia, the intellectual capital phenomenon has increasingly developed, especially after the emergence of PSAK No. 19 revision on intangible assets [9]. Although not explicitly called intellectual capital, intangible assets have received attention. Firm value in fundamental analysis is often indicated by Price Book Value (PBV), which measures stock market price performance against its book value [10]. High PBV reflects market appreciation for the company's future prospects and indicates the company's success in creating value for shareholders [11].

Research on intellectual capital has been extensively conducted with diverse results. Several studies found positive relationships between intellectual capital and financial performance [12, 13, 14], while others showed no significant relationships [15, 16]. This research gap indicates that the influence of intellectual capital on financial performance and firm value remains a complex topic requiring further investigation, especially considering intervening variables such as financial performance. This research aims to fill this gap by examining the role of intellectual capital and financial performance in enhancing firm value in manufacturing companies on the IDX.

Intellectual capital is a field of study that has attracted much researcher attention in recent decades, especially due to increasing practices of intangible asset management. The approach used to measure these intangible assets is intellectual capital, which has become a focus of attention in various fields such as management, information technology, sociology, and accounting [3]. Value Added Intellectual Coefficient (VAIC), developed by Pulic et al. (1999) [7], aims to present information about value creation efficiency from tangible and intangible company assets. VAIC™ uses company financial reports to calculate efficiency coefficients in three indicators: capital employed efficiency (CEE), human capital efficiency (HCE), and structural capital efficiency (SCE). The calculation begins with the company's ability to create value added, which is considered the most objective indicator in value creation to measure business success. Therefore, many previous empirical studies used variables developed by Pulic et al. (1999) to measure intellectual capital.

Many previous studies discussed the influence of intellectual capital on financial performance, with variations in financial performance variables used. Most studies use Return on Asset (ROA) as the financial performance variable. Nuryaman's research (2015) [14] proved that intellectual capital can improve financial performance (ROE) and firm value. Chen et al.'s research results (2005) [13] also showed that intellectual capital influences financial performance, namely Return on Equity (ROE). However, the statements of Chen et al. (2005) and Nuryaman (2015) differ from the opinions of Fitriyeni and Yuniarti (2014) [20], who stated that ROE has very low correlation with intellectual capital. Martini et al. (2016) [27] and Radic (2018) [29] also found that intellectual capital does not significantly influence ROE. The existence of this research gap, as well as the limited research using ROE as a financial performance variable, makes ROE a relevant variable for use in this research.

Previous studies on intellectual capital's impact on firm value show conflicting results, creating a significant research gap. Several studies demonstrate positive relationships: Irina (2014) found that increased intellectual capital influences firm value enhancement, while Lotfi et al. (2016), Tseng et al. (2015), and Nuryaman (2015) confirmed positive correlations between intellectual capital and firm performance measures. However, contrasting findings from Suhendra (2015) and Rashid et al. (2018) revealed no significant influence of intellectual capital on firm value. These inconsistencies are particularly critical in Indonesia's manufacturing sector, which contributes approximately 20% to national GDP and employs over 15 million workers, yet faces increasing competition requiring strategic asset optimization. The divergent findings across different contexts, company types, and time periods underscore the urgent need for sector-specific research to clarify these relationships and provide practical guidance for Indonesian manufacturing companies' value creation strategies.

2. RESEARCH METHODS

This research is an empirical study with a quantitative approach aimed at examining causal relationships between intellectual capital, financial performance, and firm value. The research design focuses on testing hypotheses regarding the influence of independent variables (intellectual capital), dependent variables (firm value), and intervening variables (financial performance). This quantitative descriptive approach analyzes statistical relationships among the studied variables using numerical data and statistical analysis methods. This study examines 35 observations from seven manufacturing companies listed on IDX during 2012-2016, representing a focused sample that enables detailed analysis while acknowledging limitations in generalizability.

Future research should consider expanding the sample size across broader manufacturing sub-sectors and extended time periods to enhance external validity and strengthen the robustness of findings.

Intellectual capital is measured using Value Added Intellectual Coefficient (VAIC) methodology, consisting of three components: (1) Value Added Capital Employed (VACA) - efficiency of physical and financial capital utilization, calculated as value added divided by capital employed; (2) Value Added Human Capital (VAHU) efficiency of human capital investment, measured as value added divided by human capital costs; and (3) Structural Capital Value Added (STVA) - efficiency of structural capital, computed as structural capital divided by value added. This comprehensive framework captures both tangible and intangible assets' contribution to value creation. Data collection employed systematic non-participant observation through document analysis of audited financial statements. The selection criteria included: (1) companies continuously listed on IDX throughout 2012-2016, (2) complete quarterly financial reporting availability, (3) positive equity values to ensure meaningful PBV calculations, and (4) consistent accounting standards application. Secondary data was sourced from Indonesian Capital Market Directory (ICMD) and Indonesia Stock Exchange (IDX) databases, ensuring data reliability and accuracy through cross-verification between sources. Variables extracted include financial metrics for calculating VAIC components (VACA, VAHU, STVA), Return on Equity (ROE), and Price-to-Book Value (PBV) across quarterly periods from 2012 to 2016.

3. RESULT AND ANALYSIS

This section presents an overview of the research object, descriptive data analysis, classical assumption test results, and hypothesis testing that have been conducted. The object of this research is manufacturing companies listed on the Indonesia Stock Exchange (IDX) and complete financial reports from 2012 to 2016. The research sample consists of 7 companies that met the established criteria, namely:

Table 1. The company being researched

No.	Company name	Code
1	Astra International Tbk	ASII
2	Charoen Pokphan Indonesia Tbk	CPIN
3	Holcim Indonesia Tbk	SMCB
4	Indocement Tunggal Perkasa Tbk	INTP
5	Intan Wijaya International Tbk	INCI
6	Kalbe Farma Tbk	KLBF
7	Kedawung Setia Industrial Tbk	KDSI

Data Variation Analysis and Industry Context

The substantial variation observed in PBV across sample companies reflects the diverse nature of manufacturing sub-sectors and their distinct market positioning. Companies like Astra International (ASII) and Kalbe Farma (KLBF), operating in automotive and pharmaceutical sectors respectively, typically command higher market premiums due to their established brand recognition, extensive distribution networks, and technological capabilities. Conversely, commodity-based manufacturers such as Holcim Indonesia (SMCB) and Indocement (INTP) in cement industry often trade closer to book value due to cyclical demand patterns and capital-intensive operations with lower differentiation potential. This variation also reflects different growth prospects, with consumer-oriented companies generally receiving higher valuations than basic materials producers.

The diversity in company performance metrics stems from fundamental differences in business models within the manufacturing sector. Pharmaceutical companies like Kalbe Farma benefit from patent protection and regulatory barriers, creating sustainable competitive advantages that translate to higher valuations. Meanwhile, diversified conglomerates like Astra International leverage multiple revenue streams and operational synergies, resulting in more stable but varied performance indicators. These sectoral differences explain why a uniform relationship between intellectual capital and firm value may not emerge across all manufacturing companies.

Analysis of Non-Significant Results

The non-significant relationship between intellectual capital (VAIC) and both financial performance and firm value may be attributed to several measurement challenges specific to the manufacturing context. The VAIC methodology, while comprehensive, may inadequately capture manufacturing-specific intellectual assets such as production process knowledge, supply chain relationships, quality control systems, and operational expertise. Traditional VAIC components (VACA, VAHU, STVA) were originally designed for knowledge-intensive industries and may not fully reflect how intellectual capital creates value in capital-intensive manufacturing environments.

During the 2012-2016 period, Indonesian capital markets may have exhibited limited recognition of intangible assets' contribution to manufacturing company value. Investors and analysts traditionally focused on tangible assets, production capacity, and financial ratios when evaluating manufacturing companies, potentially creating a temporal lag in market recognition of intellectual capital investments. This market perception bias could explain why intellectual capital failed to demonstrate significant impact on firm valuation during this period. Manufacturing companies often realize intellectual capital benefits through operational efficiency improvements, quality enhancements, and cost reductions that may not immediately translate to financial performance metrics like ROE. The value creation process from intellectual capital investments in manufacturing typically involves longer implementation cycles and indirect pathways that traditional financial metrics may not capture effectively.

Alternative Factors and Future Measurement Improvements

Future research should consider incorporating measures of technological infrastructure, automation levels, and digital transformation capabilities as components of intellectual capital assessment. In manufacturing contexts, intellectual capital increasingly manifests through advanced production systems, data analytics capabilities, and integrated supply chain management technologies that traditional VAIC measurements may overlook. Enhanced intellectual capital measurement for manufacturing companies should include operational excellence indicators such as production efficiency ratios, quality certification levels, lean manufacturing implementation, and continuous improvement program effectiveness. These metrics better reflect how knowledge and expertise translate into competitive advantages in manufacturing environments.

Manufacturing companies' intellectual capital should encompass supplier relationship quality, customer partnership strength, and industry network positioning. These relationship-based intangible assets often drive significant value creation in manufacturing through improved supply chain efficiency, customer retention, and collaborative innovation opportunities. In industries like pharmaceuticals and automotive represented in this sample, regulatory compliance expertise and quality assurance capabilities constitute critical intellectual capital components that should be explicitly measured and analyzed for their impact on firm value and performance. This comprehensive analysis suggests that while intellectual capital remains theoretically important for manufacturing companies, its measurement and market recognition require more sophisticated approaches that account for industry-specific characteristics and value creation mechanisms.

Descriptive Analysis

Descriptive analysis provides a general overview of the research data, including minimum, maximum, mean, and standard deviation values for each variable. The results of the descriptive analysis are as follows:

Table 2. Descriptive analysis

Variable	N	Minimum	Maximum	Mean	Std. Deviation
VAIC	35	-0.53	6.69	3.55	1.40
ROE	35	0.00	5.02	1.09	1.59
PBV	35	0.00	183.00	27.51	49.55

From the table above, it can be seen that the average intellectual capital (VAIC) is 3.55, the average financial performance (ROE) is 1.09, and the average firm value (PBV) is 27.51. Data variation is quite high, especially for the PBV variable, indicating significant differences in firm value among the samples.

Classical Assumption Test

Before conducting hypothesis testing, a series of classical assumption tests were performed to ensure the validity of the regression model:

1. Normality Test: The Kolmogorov-Smirnov test results show a significance value of 0.200 (greater than 0.05), indicating that the residuals are normally distributed. This is also supported by the histogram and Normal P-P Plot graphs which show a normal distribution pattern.
2. Multicollinearity Test: The tolerance values for all independent variables are above 0.1 and VIF values are below 10 (VAIC: Tolerance = 0.922, VIF = 1.084; ROE: Tolerance = 0.922, VIF = 1.084). This indicates no multicollinearity problems among the independent variables.
3. Heteroscedasticity Test: The significance values for VAIC (0.190) and ROE (0.942) are greater than 0.05, indicating no heteroscedasticity symptoms. The scatterplot graph also confirms that the points are randomly distributed without forming any specific pattern.
4. Autocorrelation Test: The Durbin-Watson value of 1.639 is within the non-autocorrelation criterion range ($1.584 < dw < 2.416$). This indicates no autocorrelation problems in the regression model.

Overall, all classical assumptions are met, so the regression model is suitable for further analysis.

Analysis of Research Results and Hypothesis Testing

Hypothesis testing was performed using multiple regression analysis and path analysis. The following is a summary of the hypothesis testing results:

Table 3. Result hypothesis testing

No.	Hypothesis	Sig. Value	Description
1	H1: Intellectual capital has a positive significant influence on company financial performance.	0.105	Data does not support hypothesis
2	H2: Intellectual capital has a positive significant influence on firm value.	0.951	Data does not support hypothesis
3	H3: Financial performance has a positive significant influence on firm value.	0.000	Data supports hypothesis
4	H4: Intellectual capital has a significant influence on firm value through financial performance.	0.600	Data does not support hypothesis

Influence of Intellectual Capital on Financial Performance (H1)

The test results show that intellectual capital (VAIC) does not significantly influence financial performance (ROE). The significance value for the relationship between VAIC and ROE is 0.105, which is greater than 0.05. This means that at a 95% confidence level, there is no significant influence of intellectual capital on ROE. This finding is consistent with the research of Martini et al. (2016) [27], Fitriyeni and Yuniarti (2014) [20], and Radic (2018) [29], who also found similar results. These results contradict some previous studies that stated a positive influence of intellectual capital on financial performance [12, 13, 14]. This difference may be due to the characteristics of the manufacturing industry in Indonesia which may not have fully optimized the role of intellectual capital in improving financial performance, or the proxies used may not fully capture the essence of intellectual capital.

Influence of Intellectual Capital on Firm Value (H2)

Intellectual capital (VAIC) also did not prove to have a significant influence on firm value (PBV). With a significance value of 0.951 (greater than 0.05), it can be concluded that there is no significant influence of VAIC on PBV. This result is consistent with the research of Suhendra (2015) [16] and Rashid et al. (2018) [28], who also found no significant influence. This finding contradicts some studies that show a positive relationship between intellectual capital and firm value [13, 19, 21, 25, 26]. This indicates that in the Indonesian manufacturing sector, the market may not fully appreciate or integrate intellectual capital as a primary factor in directly valuing companies.

Influence of Financial Performance on Firm Value (H3)

Financial performance (ROE) is proven to have a positive and significant influence on firm value (PBV). The significance value for the relationship between ROE and PBV is 0.000, which is much smaller than 0.05. The regression coefficient of 29.710 indicates that an increase in ROE will significantly increase PBV. This means that the higher the company's ability to generate profit from its equity, the higher the firm value in the eyes of investors. This finding supports the theory that strong financial performance, especially profitability, is a key factor considered by investors in assessing a company's prospects and value [10, 11]. This result is consistent with Nuryaman's research (2015) [14] which also found that financial performance plays an important role in increasing firm value.

Influence of Intellectual Capital on Firm Value through Financial Performance (H4)

The Sobel test results show that financial performance (ROE) does not mediate the relationship between intellectual capital (VAIC) and firm value (PBV). The significance value of the Sobel test is 0.600 (greater than 0.05), and the z-statistic (0.523) is less than 1.96. This means there is no significant indirect influence of intellectual capital on firm value through financial performance. This finding indicates that although financial performance directly affects firm value, intellectual capital does not significantly affect financial performance in the context of this research, so the mediation path is not formed. This differs from some studies that show that intellectual capital can affect firm value through financial performance [14].

4. CONCLUSION

This research examines the role of intellectual capital (VAIC) and financial performance (ROE) in enhancing firm value (PBV) in manufacturing companies listed on the Indonesia Stock Exchange (IDX) during 2012-2016. Based on simple and multiple regression analysis, several conclusions can be drawn:

1. Intellectual capital (VAIC) does not significantly influence financial performance (ROE). This finding suggests that in Indonesia's manufacturing sector, traditional financial metrics may not adequately capture intellectual capital's contribution. The manufacturing industry's capital-intensive nature and

focus on physical production processes may overshadow intangible assets' immediate impact on profitability measures like ROE.

2. Intellectual capital (VAIC) does not significantly influence firm value (PBV). This indicates that Indonesian capital markets during 2012-2016 may not have fully recognized or valued intangible assets in manufacturing companies. The VAIC methodology, while comprehensive, may not capture sector-specific intellectual capital contributions such as production expertise, supply chain relationships, or manufacturing innovations that are critical in this industry.
3. Financial performance (ROE) has a positive and significant influence on firm value (PBV). This confirms that profitability remains the primary driver of market valuation, reflecting investor preference for tangible financial results over intangible asset indicators in the Indonesian manufacturing context.
4. Financial performance (ROE) does not mediate the relationship between intellectual capital (VAIC) and firm value (PBV). The absence of mediation suggests that intellectual capital's potential value creation pathways in manufacturing may operate through channels not captured by traditional financial performance metrics.

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