Financial Determinants of Firm Value in Indonesia's Energy Sector: The Role of Intellectual Capital, Sales Growth, and Firm Size

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Abstract

This study examines the impact of intellectual capital, sales growth, and firm size on firm value in energy-sector manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2023. Using panel data regression with the Common Effect Model (CEM), 35 companies were selected through purposive sampling. Intellectual capital was measured using the Value Added Intellectual Coefficient (VAIC), while sales growth and firm size were proxied by revenue growth and total assets, respectively. Firm value was assessed using the Price to Book Value (PBV) ratio. None of the independent variables have a statistically significant effect on firm value, either partially or simultaneously. These findings contrast with prior studies and suggest that firm value in capital-intensive sectors may be more influenced by external factors such as market volatility or regulatory policies. The study recommends that future research integrate both internal and external determinants to better explain firm value dynamics in the energy industry.

Keywords: *Intellectual Capital; Sales Growth; Firm Size; Firm Value; Energy Sector*

JEL Classification : G32, M41

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Introduction

Firm value has become a central metric for investors and managers in evaluating a company's financial performance, strategic positioning, and long-term viability. It reflects the market's confidence in a firm's ability to generate sustainable returns and is often proxied by financial indicators such as Price to Book Value (PBV), Tobin's Q, and market capitalization (Weston & Copeland, 2010). In Indonesia, the relevance of firm value is particularly salient in the energy manufacturing sector, a strategic industry currently undergoing transformation due to global energy transition pressures, rising operational costs, and post-pandemic recovery dynamics.

Recent reports from the Indonesia Stock Exchange (IDX) show high volatility in firm value among energy-sector companies during the 2019–2023 period. These fluctuations—partly driven by external factors such as fossil fuel price instability and regulatory uncertainty—highlight the urgent need to better understand the internal financial drivers of firm value. However, there remains limited empirical clarity regarding which firm-level factors contribute meaningfully to market valuation in this sector. This situation raises the central research question:

Do intellectual capital, sales growth, and firm size have a positive and significant effect on firm value in the energy manufacturing sector?

Among internal determinants, intellectual capital (IC) has gained increasing recognition as a source of sustainable competitive advantage. It encompasses human, structural, and relational capital—elements that are difficult to imitate and capable of enhancing organizational value creation. However, IC is inherently intangible, making its measurement and integration into empirical financial analysis a persistent challenge. In this regard, the Value Added Intellectual Coefficient (VAIC), introduced by Pulic (1998), offers a robust and standardized method to assess the efficiency of intellectual capital utilization. Co Compared to other approaches for measuring intellectual capital—such as the Balanced Scorecard or the Intellectual Capital Disclosure Index—the Value Added Intellectual Coefficient (VAIC) offers several distinct advantages. First, it is quantitative, as it relies on audited financial statement data, thus enhancing its objectivity and replicability. Second, VAIC enables inter-firm and inter-temporal comparisons, making it suitable for both cross-sectional and longitudinal studies. Third, it integrates seamlessly with traditional financial performance analysis, making

it highly relevant for empirical research in capital market contexts where data transparency and comparability are essential.

While theoretical frameworks such as Agency Theory (Jensen & Meckling, 1976) and Signaling Theory (Spence, 1973) provide a foundational basis for analyzing internal firm characteristics and their influence on firm value, prior studies often apply these theories in a generalized manner across industries. They frequently overlook the unique dynamics of regulated, capital-intensive sectors such as energy manufacturing. In these sectors, high fixed costs, long asset lifecycles, and strong regulatory dependencies can attenuate or even obscure the signaling effects of internal variables like intellectual capital, sales growth, or firm size. This underscores the need for a more nuanced and context-specific theoretical application.

A closer examination of the existing literature also reveals several empirical gaps. First, research on the relationship between VAIC, sales growth, and firm size with firm value often yields inconsistent results across different sectors and regions. While some studies report statistically significant and positive effects (e.g., Aprianti, 2018; Halimahtussakdiah et al., 2022), others suggest that such relationships are conditional—depending on profitability, industry maturity, or macroeconomic factors (e.g., Ramadhayani & Widiyati, 2024). Second, few studies have comprehensively integrated these three variables within a single model that is specific to the Indonesian energy manufacturing sector, despite its strategic importance and susceptibility to external shocks. This creates a notable gap in the empirical literature, especially concerning multi-year panel data that could capture dynamic trends over time.

To address these theoretical and empirical shortcomings, the present study empirically investigates the influence of intellectual capital (as measured by VAIC), sales growth, and firm size on firm value among energy-sector manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. The selection of these variables reflects both their theoretical significance in signaling firm strength and their practical relevance to value creation within a complex and regulated industrial environment.

This research makes three major contributions. First, from a theoretical standpoint, it sharpens the application of Agency and Signaling Theory in the context of capital-intensive industries, while also promoting the use of VAIC as a robust and structured model for evaluating intellectual capital in emerging markets. Second, on the empirical level, it fills a key gap by providing sector-specific, panel-data-based evidence that spans both pre- and post-pandemic periods, thereby capturing the effects of energy market transitions and

macroeconomic shifts on firm value. Third, the study offers practical implications: for corporate managers, it highlights the relevance of managing intangible assets and growth trajectories more strategically; for investors and policymakers, it provides insights into the underlying financial drivers of valuation in one of Indonesia's most vital economic sectors.

Literature Review

Firm Value

Firm value refers to the overall worth of a company as perceived by investors, reflecting the firm's ability to generate sustainable returns and manage financial and operational risks effectively. It is commonly proxied by financial indicators such as Price to Book Value (PBV), Tobin's Q, or Price Earnings Ratio (PER) (Weston & Copeland, 2010). High firm value indicates greater investor confidence and stronger corporate governance, often driven by strategic resource utilization (Purwanti, 2020).

In capital-intensive and heavily regulated industries such as energy manufacturing, firm value is also shaped by external shocks—such as policy changes, commodity price fluctuations, and ESG (Environmental, Social, and Governance) compliance—which amplify the importance of internal efficiency and adaptability (Ganguli & Guha Deb, 2021). Hence, understanding internal factors that contribute to firm value is critical, particularly within sector-specific contexts in emerging markets like Indonesia.

Intellectual Capital

Intellectual capital (IC) refers to the intangible assets of a firm, encompassing human capital, structural capital, and relational capital. These components support innovation, productivity, and long-term competitive advantage. To capture its efficiency, Pulic (1998) introduced the Value Added Intellectual Coefficient (VAIC) model, which translates IC performance into measurable ratios derived from financial statements.

VAIC is widely adopted due to its objectivity, consistency, and compatibility with capital market data (Ozkan et al., 2017). In emerging markets, Bayraktaroglu, Calisir, & Baskak (2019) confirmed that VAIC positively influences firm value across manufacturing and energy

sectors. Khan, Rafiq, & Hussain (2020) further emphasized that IC has a more pronounced effect in utility and energy firms, where long-term expertise and regulatory navigation are strategic assets.

However, studies in Indonesia present mixed findings. Sawarjuwono & Kadir (2020) and Aprianti (2018) report a positive and significant relationship between VAIC and firm value. In contrast, others (e.g., Putri et al., 2019) suggest that this relationship may be conditional on profitability or moderated by industry maturity and market transparency. These inconsistencies highlight the need to contextualize the role of IC in specific sectors, especially in energy manufacturing.

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

Sales Growth

Sales growth reflects a company's ability to expand revenue, market reach, and customer acquisition. It is grounded in Penrose's Theory of the Growth of the Firm (1959), which argues that firms grow by exploiting internal capabilities and managerial capacity. From a market perspective, sales growth also serves as a forward-looking signal of profitability and expansion potential, in line with Signaling Theory (Spence, 1973).

Numerous studies confirm a positive relationship between sales growth and firm value. For instance, Dolontelide & Wangkar (2019) found that higher sales growth significantly improves firm valuation in Indonesian manufacturing firms. However, Kusmita, Norisanti, and Saori (2022) observed that sales growth must be accompanied by profitability to be value-accretive, particularly in the context of the transportation sub-sector during the COVID-19 pandemic.

Beyond the domestic context, Cheng et al. (2021) revealed that in China's state-owned energy enterprises, revenue growth alone was insufficient to raise firm value unless combined with capital efficiency. This supports the idea that in energy sectors, where operating costs and investment horizons are longer, growth must be interpreted with caution.

H2: Sales growth has a positive and significant effect on firm value.

Firm Size

Firm size, typically measured by the natural logarithm of total assets, captures a firm's operational scale, resource capacity, and market influence. Larger firms often benefit from

economies of scale, better bargaining power, and more robust governance structures, which theoretically improve value creation and reduce agency problems (Jensen & Meckling, 1976).

In Indonesia, studies by Rahmasari & Triyonowati (2024) and Gani (2022) report a positive influence of firm size on value, particularly in manufacturing industries. Similarly, Azaroh and Majidi (2024) found that the effect of firm size on firm value was either statistically insignificant or nonlinear, indicating that a larger scale does not necessarily translate into higher firm valuation across all industry sectors.From a regional perspective, Tran & Vo (2020) found that firm size only enhances value in competitive sectors with institutional investor oversight. In capital-intensive industries like energy, Alipour et al. (2022) emphasize that firm size may become a neutral signal unless it reflects efficiency, transparency, and regulatory alignment.

H3: Firm size has a positive and significant effect on firm value.

Theoretical Framework

This study is grounded in three interrelated theoretical perspectives: Agency Theory, Signaling Theory, and Institutional Theory, each of which offers complementary insights into the determinants of firm value in capital-intensive industries such as energy manufacturing.

Agency Theory (Jensen & Meckling, 1976) posits that conflicts of interest between managers (agents) and shareholders (principals) can lead to suboptimal decision-making, especially when managerial actions are not fully observable. In the context of the energy sector—characterized by high capital expenditure, regulatory constraints, and long-term investment cycles—such conflicts are amplified. The strategic use of intangible assets, including intellectual capital (IC), becomes a key mechanism for agents to demonstrate their commitment to long-term value creation. Effective management and disclosure of IC can reduce information asymmetry and align managerial behavior with shareholder interests, especially in firms where tangible outputs may not immediately reflect strategic capabilities.

Signaling Theory (Spence, 1973) explains how companies convey unobservable qualities (such as efficiency, innovation, or future profitability) to external stakeholders through observable indicators. In energy-sector firms, traditional financial indicators may not fully capture firm potential due to the sector's inherent volatility. As such, intellectual capital, sales growth, and firm size can serve as strategic signals of internal strength, operational scale, and market positioning. However, the effectiveness of these signals is contingent upon their clarity

and credibility—attributes that may vary based on industry norms, regulatory pressures, and stakeholder expectations.

To enhance the explanatory power of Signaling Theory in this context, it is essential to incorporate insights from Environmental, Social, and Governance (ESG) frameworks and Institutional Theory. The ESG perspective recognizes that firms in the energy sector are increasingly evaluated not only based on financial performance but also on how they manage environmental impact, stakeholder relations, and governance structures. These factors shape market perceptions and thus influence firm value. Institutional Theory (North, 1990) further explains that firm behavior is shaped by formal and informal rules, including regulatory policies, industry standards, and societal expectations. In regulated sectors like energy, compliance with institutional norms and proactive adaptation to policy shifts can serve as additional signals of firm legitimacy and resilience.

Taken together, these theories suggest that firm value in the energy sector is influenced not only by traditional financial metrics but also by how well firms manage intangible resources and respond to institutional pressures. This theoretical integration justifies the selection of intellectual capital (measured via VAIC), sales growth, and firm size as independent variables in this study, each representing a dimension of firm capability that is theoretically linked to market valuation through agency alignment, signal credibility, and institutional legitimacy.

In this study, the integration of Environmental, Social, and Governance (ESG) considerations into the theoretical framework is not merely an extension of signaling logic, but a reflection of evolving institutional expectations in the energy sector. ESG dimensions increasingly serve as alternative signals of long-term resilience, risk management, and ethical governance—factors that investors consider when assessing firm value beyond financial performance alone. From an institutional theory standpoint, ESG disclosures represent organizational responses to both formal pressures (e.g., government regulations, sustainability standards) and informal norms (e.g., societal expectations, reputational demands). Thus, incorporating ESG into this theoretical model aligns with the reality that firm value is co-determined by both financial capabilities and institutional legitimacy, especially in capital-intensive, regulation-bound industries like energy manufacturing.

Research Methods

This study employs a quantitative approach with an associative and explanatory research design, aimed at examining the influence of intellectual capital, sales growth, and firm size on firm value. This approach is appropriate for testing hypotheses based on numerical data and statistical inference (Sugiyono, 2017).

The population in this study comprises 83 energy-sector manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the period 2019–2023. A purposive sampling technique was applied based on the following criteria: (1) companies consistently listed in the energy sector during the study period; (2) availability of complete audited annual reports for five consecutive years; (3) financial statements presented in Indonesian Rupiah; and (4) companies that did not report net losses during the observation period. Based on these criteria, a final sample of 35 companies was selected. The study uses secondary data, consisting of annual financial statements and annual reports obtained from the official IDX website (www.idx.co.id) and from each company's official website.

Each research variable is defined and operationalized based on well-established concepts and measurement standards, as presented in Table 1 below. Firm value is proxied by the Price to Book Value (PBV) ratio. Intellectual capital is measured using the Value Added Intellectual Coefficient (VAIC) model introduced by Pulic (1998), which includes VACA, VAHU, and STVA components. Sales growth is calculated as the percentage increase in net sales compared to the previous year, and firm size is proxied by the natural logarithm of total assets (Ln Total Assets).

To analyze the data, multiple linear regression analysis was employed using EViews 12 software. Prior to hypothesis testing, the data underwent classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation, to ensure the validity and reliability of the regression model. Hypotheses were tested using the F-test (for joint significance) and t-test (for individual significance), while the adjusted coefficient of determination (Adjusted R^2) was used to assess the explanatory power of the independent variables in the model.

Table 1 Operationalization of Research Variables

No	Variable	Indicator / Proxy	Scale	Source / Citation
1	**Firm Value** (Y)	Price to Book Value (PBV): Market price of stock divided by book value of equity	Ratio	Sujoko & Soebiantoro (2020)
2	**Intellectual Capital** (X1)	VAIC (Pulic, 1998): 1. VACA (Value Added Capital Employed) 2. VAHU (Value Added Human Capital) 3. STVA (Structural Capital Value Added)	Ratio	Pulic (1998); Sawarjuwono & Kadir (2020)
3	**Sales Growth** (X2)	Percentage increase in net sales compared to the previous year	Percentage	Dolontelide & Wangkar (2019)
4	**Firm Size** (X3)	Natural logarithm of total assets (Ln Total Assets)	Ratio	Rahmasaari & Triyonowati (2024)

This study uses panel data regression analysis to examine the effect of Intellectual Capital (X1), Sales Growth (X2), and Firm Size (X3) on Firm Value (Y). The model combines cross-sectional and time series data from manufacturing companies in the energy sector listed on the Indonesia Stock Exchange for the period 2019–2023.

The general form of the panel data regression model employed is as follows:

$$Yit = \alpha + \beta 1X1it + \beta 2X2_{it} + \beta 3X3_{it} + \varepsilon_{it}$$

Where:

Yit = Firm Value for company *i* in year *t*

α = Intercept (constant term)

β1,β2,β3 = Coefficients of the independent variables

X1it = Intellectual Capital

X2it = Sales Growth

X3it = Firm Size

εit = Error term

To determine the most appropriate estimation method, three diagnostic tests were conducted: The Chow Test indicated that the Common Effect Model (CEM) was preferable to the Fixed Effect Model (FEM), as the cross-section F-statistic yielded a *p*-value > 0.05. The Lagrange Multiplier (LM) Test, based on the Breusch-Pagan approach, also failed to reject the null hypothesis, indicating that the Random Effect Model (REM) did not provide a better fit. Based on these results, the Common Effect Model (CEM) was selected as the most appropriate model, estimated using the Panel Least Squares (PLS) method via EViews 12 software.

Prior to regression analysis, classical assumption tests—including normality, multicollinearity, heteroscedasticity, and autocorrelation, were conducted to ensure the validity and robustness of the model. The hypothesis tests employed were the F-test (to assess joint significance) and t-test (to assess individual variable significance). The Adjusted R^2 was used to evaluate the explanatory power of the model.

It is important to acknowledge that the model does not incorporate robustness checks such as Fixed Effect, Random Effect, or alternative specifications like interaction terms or external control variables (e.g., energy prices, regulatory shocks). Future studies are encouraged to explore these extensions to improve the model's explanatory depth and theoretical alignment with sector-specific dynamics.

Results and Discussions

Results

The descriptive statistical analysis provides an overview of the distribution and characteristics of each variable in the study: Intellectual Capital (X1), Sales Growth (X2), Firm Size (X3), and Firm Value (Y), based on 35 observations from energy sector manufacturing companies listed on the Indonesia Stock Exchange for the period 2019–2023. Table 2 is following:

Table 2 Descriptive Statistics Table of Research Variables

Statistic	Intellectual Capital (X1)	Sales Growth (X2)	Firm Size (X3)	Firm Value (Y)
Mean	1,499.491	0.874286	2,783.600	29.05049
Median	13.89000	0.050000	2,737.000	1.964000
Maximum	11,590.65	18.28000	3,145.000	740.8970
Observations	35	35	35	35

Source : Eviews 12

The Intellectual Capital (X1) variable has a mean of 1,499.49 and a high standard deviation of 3,184.91, indicating substantial variability across companies. The large gap between the minimum (3.83) and maximum (11,590.65) values suggests the presence of outliers or significant differences in how firms manage and report intellectual capital. Theoretically, under the Resource-Based View (RBV), intellectual capital, encompassing knowledge, innovation, and human resources, is considered a key intangible asset that can foster sustainable competitive advantage. However, the wide variation indicates that not all firms are equally effective in leveraging these strategic resources.

The Sales Growth (X2) variable has a low mean of 0.87 with a relatively high standard deviation of 3.15. The minimum value is negative (-0.41), indicating contraction in some firms, while the maximum reaches 18.28, showing aggressive growth in others. According to Firm Growth Theory (Penrose, 1959), sales growth is an indicator of expansion and performance. Nevertheless, the inconsistency in growth rates among companies reveals a lack of stability in market performance and investor confidence, which may reduce the overall predictability of firm value.

The Firm Size (X3) variable shows a mean of 2,783.60 and a standard deviation of 190.52, with values ranging from 2,488 to 3,145. Compared to other variables, firm size appears relatively stable, suggesting that most firms in the sample are medium to large-scale enterprises. From the lens of Signaling Theory, larger firms are perceived as more credible and less risky investments due to their access to financing, economies of scale, and operational efficiency. This relative consistency supports the notion that firm size may serve as a more reliable predictor of firm value.

The Firm Value (Y) variable, used as the dependent variable, has a mean of 29.05 and a high standard deviation of 124.46. The wide range from a minimum of 0.14 to a maximum of 740.89 reflects considerable disparity in firm valuation, which can be attributed to both financial performance and external investor perceptions. According to Agency Theory and Signaling Theory, firm value reflects how well management aligns with shareholders' interests and how effectively information is conveyed to the market. The high variation suggests that firms differ significantly in how they are valued by the market, possibly due to internal governance practices or market speculation.

In conclusion, the descriptive analysis highlights substantial variability across key predictors, especially in intellectual capital and sales growth. While firm size is relatively consistent and may play a stabilizing role, the volatility of firm value implies that other external or unobserved factors may also significantly influence firm performance and valuation in the energy manufacturing sector.

Panel Data Regression

Table 3 Regression Result – Common Effect Model (CEM)

Dependent Variable: Firm Value (Y)
Method: Panel Least Squares
Sample: 2019–2023
Observations: 35

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C (Constant)	437.7913	366.1252	1.1957	0.2409
Intellectual Capital (X1)	-0.0000199	0.008020	-0.0025	0.9980
Sales Growth (X2)	-3.076611	6.929453	-0.4440	0.6601
Firm Size (X3)	-0.145862	0.133493	-1.0927	0.2830
Statistic	**Value**			
R-squared	0.0546			
Adjusted R-squared	-0.0369			
Standard Error of Reg.	126.7333			

Variable	Coefficient	Std. Error t-Statistic Prob.
F-statistic	0.5965	
Prob (F-statistic)	0.6221	
Durbin-Watson stat	2.5032	

The regression results indicate that none of the independent variables—**intellectual capital**, **sales growth**, or **firm size**—have a statistically significant effect on firm value, as proxied by the Price to Book Value (PBV) ratio. The coefficient for **intellectual capital**, measured by VAIC, is -0.0000199 with a p-value of 0.9980, indicating an extremely weak and statistically insignificant relationship. This negative and near-zero coefficient suggests that intellectual capital does not play a meaningful role in shaping firm value within the Indonesian energy manufacturing sector, possibly due to the sector's heavy reliance on physical assets and regulatory compliance over intangible resource efficiency.

Similarly, **sales growth** exhibits a negative coefficient of -3.0766 with a p-value of 0.6601, also indicating no significant influence. This result contradicts theoretical expectations and suggests that revenue growth alone may not be perceived positively by investors in this sector, particularly if it is not supported by profitability or operational efficiency. The coefficient for **firm size** is -0.1459 with a p-value of 0.2830, implying that increases in company scale do not contribute significantly to firm valuation. The negative sign may reflect inefficiencies or structural rigidities often found in large, capital-intensive firms within the energy industry.

Overall, the **R-squared value of 0.0546** indicates that the model explains only 5.46% of the variance in firm value, and the **F-statistic p-value of 0.6221** confirms that the model lacks joint explanatory power. These findings suggest that **traditional internal financial variables alone are insufficient to explain variations in firm value** in the energy sector context. External and qualitative factors—such as commodity price volatility, regulatory shifts, or ESG performance—may exert stronger influence and should be explored in future research to build a more comprehensive understanding of valuation dynamics in this strategic industry.

To determine the most appropriate regression model for panel data analysis, three tests were conducted sequentially: the Chow test, the Hausman test, and the Lagrange Multiplier (LM) test. These tests help identify the best fit among the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM).

Table 4 Chow Test, Lagrange Multiplier and Hausman Test

Test Type	Objective	Test Statistic	p-value	Preferred Model
Chow Test	CEM vs. FEM	Chi-square = 5.90	0.4345	Common Effect Model (CEM)
Lagrange Multiplier	CEM vs. REM	BP = 0.3948	0.5298	Common Effect Model (CEM)
Hausman Test	FEM vs. REM	Not applicable	–	Not conducted (FEM rejected)

Source : Eviews 12

The Chow test was conducted first to compare the Common Effect Model and the Fixed Effect Model. The result showed a cross-section Chi-square probability value of 0.4345, which is greater than the significance level of 0.05. This implies that the null hypothesis cannot be rejected, and therefore, the Common Effect Model (CEM) is preferred over the Fixed Effect Model.

Following this, the Lagrange Multiplier (LM) test was applied to compare the Common Effect Model with the Random Effect Model. The Breusch-Pagan probability value was 0.5298, which also exceeds the 0.05 threshold. Hence, the null hypothesis stating that the Common Effect Model is sufficient cannot be rejected. Consequently, the Random Effect Model (REM) is not superior to the CEM. Based on the outcomes of both the Chow and Lagrange Multiplier tests, the Common Effect Model (CEM) was determined to be the most suitable model for this panel data analysis.

Discussion

The findings of this study offer nuanced insights into how intellectual capital, sales growth, and firm size contribute to firm value in energy-sector manufacturing firms in Indonesia during 2019–2023. First, the empirical results revealed that intellectual capital does not have a statistically significant effect on firm value ($p = 0.9980$). This contrasts with numerous previous studies such as Halimahtussakdiah et al. (2022) and Aprianti (2018), which found a positive and significant relationship between intellectual capital and firm value using the VAIC model. This discrepancy may be attributed to sectoral differences, as energy companies tend to rely

more heavily on physical assets and regulatory capital than on intangible knowledge assets. Moreover, the volatility and capital-intensity of the energy sector may dilute the short-term observable impact of intellectual capital on market valuation. Nevertheless, the theoretical foundation grounded in the Resource-Based View (RBV) remains valid, suggesting that the inconsistency lies not in the irrelevance of intellectual capital, but in the contextual challenges of its valuation and reporting.

Second, sales growth also shows no significant effect on firm value ($p = 0.6601$), suggesting that increased revenue does not necessarily translate into higher investor valuation in this sector. This finding diverges from research by Dolontelide and Wangkar (2019), which found that robust sales growth signals future profitability and market strength. However, the results align with studies such as Kusmita, Norisanti, and Saori (2022), who emphasize that revenue growth without corresponding profit efficiency may fail to influence firm value. In capital-intensive industries like energy manufacturing, growth often entails high operational costs and capital expenditures, which may suppress net profitability and weaken investor response to sales figures alone.

Third, firm size was also found to be insignificant in affecting firm value ($p = 0.2830$). This contradicts studies by Rahmasari dan Triyonowati (2024) and Gani (2022), which documented a positive correlation between firm size and market valuation. Theoretically, Signaling Theory posits that larger firms send more credible signals to the market due to their perceived stability, resource access, and governance structures. However, in this study, the insignificant result suggests that size alone may not be a sufficient signal in the energy sector without transparency, efficiency, or profitability accompanying that scale.

Collectively, the F-test indicates that the independent variables—intellectual capital, sales growth, and firm size—do not significantly influence firm value simultaneously (Prob F-statistic = 0.6221). This finding challenges the general assumption in prior literature that these internal factors are strong determinants of valuation and suggests that external variables, such as energy price volatility, political regulation, or macroeconomic trends—may exert stronger influence in this industry. While the adjusted R-squared value of -0.0369 further confirms the model's limited explanatory power, it also opens an avenue for future research to incorporate broader determinants, including ESG factors, financial leverage, or risk management practices.

Theoretically, these results provide partial support for Agency Theory and Signaling Theory, but also expose their limitations in contexts where financial and operational

complexity reduce the clarity of internal signals. Investors in capital-heavy sectors may be more responsive to external shocks or sectoral policy shifts than to internal indicators traditionally used in valuation models.

In summary, while the theoretical models used in this study remain relevant, the empirical findings highlight the need to contextualize internal performance metrics within industry-specific dynamics. These results underscore that firm value in the energy sector cannot be fully explained by traditional internal financial indicators alone, and call for integrated frameworks that account for both tangible and intangible, internal and external determinants.

Conclusions

This study aimed to examine the effect of intellectual capital, sales growth, and firm size on firm value in energy-sector manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. Using panel data regression and applying the Common Effect Model as determined by diagnostic tests (Chow, Lagrange Multiplier), the empirical results revealed that none of the independent variables exerted a statistically significant influence on firm value, as proxied by the Price to Book Value (PBV) ratio.

Specifically, the coefficients for intellectual capital (VAIC), sales growth, and firm size were all negative and statistically insignificant, with p-values far exceeding the 5% significance level. The model also exhibited a low explanatory power, with an adjusted R-squared value of -0.0369 and an F-statistic p-value of 0.6221, indicating that the variation in firm value could not be adequately explained by the selected variables.

These findings suggest that traditional internal financial indicators, such as intangible asset efficiency, revenue expansion, and asset size, may not be reliable predictors of market valuation in the Indonesian energy manufacturing sector. The result deviates from mainstream theoretical expectations rooted in agency theory, signaling theory, and resource-based perspectives. One possible explanation is that firm value in this capital-intensive and regulation-heavy sector is more heavily influenced by external or contextual factors, such as energy price fluctuations, policy shifts, or environmental, social, and governance (ESG) practices, which were not incorporated in the current model.

Recommendations

Future research is encouraged to address the limitations of this study by incorporating a broader set of explanatory variables, particularly those that reflect external or contextual influences. Variables such as commodity price volatility, ESG performance, and regulatory index scores may offer deeper insights into the valuation dynamics of energy-sector firms, which operate in environments shaped by policy shifts and sustainability pressures. Additionally, future studies should consider using alternative proxies of firm value—such as Tobin's Q or market capitalization—to capture different dimensions of market performance beyond the Price to Book Value (PBV) ratio. Comparative analyses across sectors may also help clarify the extent to which industry characteristics moderate the relationship between internal factors and firm value. Finally, employing qualitative or mixed-method research designs could enrich the understanding of investor perception and strategic decision-making processes that are not easily quantifiable through financial ratios alone.

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