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The Effects of Green Accounting, Green Intellectual Capital, and Environmental Performance on Firm Value

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Abstract

Growing pressure to implement sustainability practices and Environmental, Social, and Governance (ESG) principles has encouraged energy companies to integrate environmental considerations into their business strategies. Nevertheless, empirical evidence on the relationship between sustainability practices and firm value remains inconclusive, particularly in emerging markets. This study examines the effects of green accounting, green intellectual capital, and environmental performance on firm value among energy companies listed on the Indonesia Stock Exchange (IDX) during the 2022–2025 period. A quantitative explanatory research design was employed using secondary data obtained from companies' annual reports and sustainability reports. The sample consisted of 17 companies, resulting in 68 firm-year observations selected through purposive sampling. Data were analyzed using multiple linear regression. The findings indicate that green accounting and green intellectual capital do not have statistically significant effects on firm value, whereas environmental performance has a negative and significant effect on firm value. These results suggest that sustainability-related information has not yet been fully incorporated into investors' valuation decisions within Indonesia's energy sector. This study contributes to the sustainability accounting and corporate finance literature by providing empirical evidence from an emerging market and offers practical implications for managers in aligning sustainability initiatives with operational efficiency and financial performance to enhance long-term firm value.

Keywords: green accounting, green intellectual capital, environmental performance, corporate value, energy sector.

Introduction

Enterprise value is a key indicator that reflects the market's assessment of a business entity's performance, prospects, and sustainability (Manan et al., 2025; Resini & Mimba, Ni Putu Sri Harta, 2025). This indicator is often used as the basis for investment decisions because it represents investors' expectations regarding a company's ability to generate future cash flows (Fikriyah & Wiyanti, 2023). The market's increasing focus on non-financial factors means that a company's value now depends not only on financial performance but is also influenced by the quality of its corporate governance, its image or reputation, and the entity's commitment to fulfilling its social responsibilities and environmental stewardship (Cahyanto & Budiman, 2025). Thus, a company's value reflects investors' perceptions of the business's sustainability and the long-term risks inherent in the company's activities (Astuti & Ahmar, 2025; Widiyaningsih & Nugroho Jati, 2024).

This shift in investor assessment criteria is particularly relevant in the energy sector, which is high-risk and has a significant environmental impact. In recent years, this sector has faced commodity price volatility as well as demands for transparent environmental management (Manan et al., 2025; Resini & Mimba, Ni Putu Sri Harta, 2025). This has driven the integration of environmental aspects into accounting and resource management to safeguard reputation and market confidence (Astuti & Ahmar, 2025; Della Gusvinaa, Wirmie Eka Putrab, 2025).

These pressures are empirically reflected through declining financial performance and company valuations in the energy sector during 2022–2025. A prominent example is PT Medco Energi Internasional Tbk, which experienced a decline in net profit in the first semester of 2025 from US$202.27 million to US$37.36 million, a decrease of 81.5%, and cumulatively from January to September, profit fell from US$273.27 million to US$85.65 million, or 68.66%, due to weakening oil and gas business operations and declining global oil prices (Bisnis.com 2025; IDNFinancials 2025). PT Bayan Resources Tbk also recorded a profit decline from US$1.238 billion in 2023 to US$922.64 million in 2024, a decrease of 25.5%, amid weakening global coal prices and mounting pressure on the coal mining sector (Bloomberg Technoz, 2025; JAKARTA, 2025). At the industry level, profits of national coal companies plummeted by as much as 67% in 2024 despite production reaching a record 836 million tons, demonstrating that increased output no longer guarantees company

profitability (KABARBURSA.COM, 2025). Furthermore, PT Pertamina (Persero) experienced a profit decline from US$4.77 billion in 2023 to US$3.13 billion in 2024, a decrease of 34.38%, due to declining oil prices and narrowing business margins (Ruang Energi, 2025).

This phenomenon indicates that increased operational activity does not necessarily lead to an increase in firm value without being supported by sustainable practices and sound environmental management. This issue is significant because investors now consider not only financial aspects but also environmental and sustainability factors when assessing a company's long-term prospects. Studies examining the connections between green accounting, green intellectual capital, environmental performance, and firm value demonstrate conflicting findings. Moreover, scholarly attention has concentrated on manufacturing and primary materials industries, leaving the energy sector insufficiently explored. Thus, additional investigation is essential to establish empirical data on determinants of corporate value within the energy industry.. In this context, attention to green accounting practices is becoming increasingly important as a tool for managing and disclosing a company's environmental impact.

Green accounting is understood as an accounting approach that integrates the recording and disclosure of environmental costs and benefits into a company's financial and sustainability information (Azzahra, 2022; Muflihah & Pamungkas, 2024). The implementation of this practice has the potential to increase environmental transparency and accountability, thereby strengthening investor confidence (Azzahra, 2022). However, green accounting also faces risks when environmental information is not yet fully appreciated by the market or is perceived as an additional cost burden without direct economic benefits (Z. V Putri & Wardhani, 2025). Empirically, some studies have found a positive effect of green accounting on firm value (Azzahra, 2022; Muflihah & Pamungkas, 2024), while findings indicating a non-significant relationship are still encountered (Z. V Putri & Wardhani, 2025) thus opening the door for further research, particularly in the energy sector.

In addition to green accounting, green intellectual capital is also a key factor in supporting sustainability and corporate value creation. Green intellectual capital refers to intangible resources that include environmental knowledge, human resource competencies, organizational systems, and sustainability-oriented external networks (Ahmad et al., 2025; Suengkamolpisut et al., 2025). Managing these assets provides strategic benefits through improved sustainable performance and the development of a competitive advantage based on green capabilities that are relatively difficult for competitors to replicate (Martínez-Falcó et al., 2025; Suengkamolpisut et al., 2025). However, the development of green intellectual capital also carries risks because it requires long-term investment, and its results are not always directly reflected in corporate value based on market indicators (Martínez-Falcó et al., 2025; Shahbaz & Malik, 2025). Empirical evidence suggests that green intellectual capital influences sustainable performance and competitive advantage, which form the foundation of long-term corporate value (Martínez-Falcó et al., 2025; Suengkamolpisut et al., 2025), while other studies indicate that its impact on corporate value is indirect or less significant (Ahmad et al., 2025; Martínez-Falcó et al., 2025; Shahbaz & Malik, 2025).

Environmental performance refers to a company's ability to control and minimize the environmental impacts of its operations through regulatory compliance, emissions management, and efficient use of resources (Kristy & Bhayangkara, 2024; Pertiwi & Januarti, 2025). Improvements in environmental performance contribute to strengthening a company's image, increasing market confidence, and ensuring business sustainability, which can ultimately drive an increase in corporate value (Aditya et al., 2025; Cahyanto & Budiman, 2025). Nevertheless, efforts to improve environmental performance also carry risks because they require significant environmental cost allocations and do not always yield economic benefits in the short term (Pertiwi & Januarti, 2025; Wigiarni & Chandra, 2024). Empirically, a number of studies have found that environmental performance influences corporate value, both directly and through the mechanisms of disclosure and green financing (Aditya et al., 2025; Cahyanto & Budiman, 2025; Kristy & Bhayangkara, 2024; Saputri et al., 2023). Conversely, other studies have shown different results, indicating that the relationship between environmental performance and firm value remains inconsistent (Amarylis & Rosiyana, 2025; Syahrainy et al., 2023; Wigiarni & Chandra, 2024).

This study extends the research of Manan et al. (2025), which examined the influence of green accounting and green intellectual capital on firm value, by incorporating environmental performance as an additional explanatory variable based on the framework proposed by Pamudya and Sumaryati (2025). The inclusion of environmental performance enables this study to develop a more comprehensive sustainability model that simultaneously examines the roles of environmental accounting practices, intangible green resources, and

environmental achievements in explaining firm value. Beyond differences in sector and observation period, this study expands previous research by evaluating whether these three sustainability dimensions jointly explain firm value within the unique context of Indonesia's energy sector, where companies face high environmental risks, strict regulatory requirements, and commodity price volatility. Furthermore, this study provides empirical evidence that the relationships among green accounting, green intellectual capital, environmental performance, and firm value remain inconclusive in emerging markets, suggesting that investors continue to place greater emphasis on financial fundamentals than on sustainability-related information. These findings offer additional insights into the applicability of Signaling Theory and Legitimacy Theory in explaining how sustainability practices are interpreted by capital market participants.

Literature Review

Signal Theory

Signaling theory explains that companies can send signals to external parties through information disclosure to reduce information asymmetry between management and investors in assessing the company's current condition and future prospects (Friske et al., 2023). In the context of sustainability, the disclosure of non-financial information has become crucial because investors no longer consider only profitability but also pay attention to a company's environmental responsibility and sustainability. The implementation of green accounting reflects a company's transparency in managing environmental impacts, thereby serving as a positive signal to investors regarding the quality of governance and long-term risk management (Susanti & Arneta, 2024). Furthermore, green intellectual capital demonstrates a company's ability to manage knowledge, innovation, and environment-based resources that support sustainable competitive advantage (Manan et al., 2025). Strong environmental performance is also perceived as a credible signal that the company is committed to environmental stewardship and operational sustainability (Ratnawati, 2025). The positive signals generated by the implementation of green accounting, green intellectual capital, and environmental performance are expected to increase investor confidence, strengthen market expectations regarding the company's prospects, and drive an increase in corporate value.

Legitimacy Theory

Legitimacy theory explains that the sustainability of a company depends on its ability to align its operational activities with the values, norms, and expectations of society so that the company obtains social recognition for its existence (O'Neill et al., 2022). For energy sector companies with high environmental impact, legitimacy becomes a critical aspect because their operational activities frequently attract attention from society, government, and investors. Therefore, companies must demonstrate their commitment to sustainability through various environmental practices and social information disclosures. The implementation of green accounting represents one form of corporate responsibility in disclosing environmental activities as an effort to obtain public legitimacy (Hardiyansah & Agustini, 2021). Furthermore, the management of green intellectual capital reflects the company's ability to develop environmentally-friendly knowledge, systems, and innovations that support business sustainability and enhance the company's image among stakeholders (Suengkamolpisut et al., 2025). Strong environmental performance also serves as an indicator that the company has conducted operations in accordance with regulations and social expectations through responsible management of environmental impacts (Pamudya & Sumaryati, 2025). Consequently, adopting green accounting, green intellectual capital, and environmental performance constitutes legitimacy mechanisms to preserve public confidence, minimize social and regulatory tension, and enhance firm value from market and investor perspectives.

Hypothesis Development

Green accounting is an accounting practice that integrates the measurement and disclosure of environmental costs and impacts into corporate reports as a demonstration of commitment to sustainability and the quality of resource management (Altarawneh et al., 2025). From a signaling theory perspective, green accounting disclosures serve as credible non-financial signals to reduce information asymmetry between management and investors and reflect transparency and long-term environmental risk management (Altarawneh et al., 2025). These signals shape investors' positive perceptions of the company's sustainability prospects and future performance. A body of empirical evidence indicates that green accounting and environmental disclosures have a positive impact on firm value through enhanced reputation, market confidence, and the quality of information for investors (Andina et al., 2025; Desmiyawati et al., 2025; Fina, 2024; Ratnawati, 2025; Susanti & Arneta, 2024). Therefore, the following hypotheses are formulated:

H1: Green accounting has a significant positive effect on firm value.

Green intellectual capital represents a company's environmentally oriented knowledge resources, including green human capital, green structural capital, and green relational capital, which play a role in driving innovation and fostering sustainable competitive advantage (Tonay & Murwaningsari, 2022). Within the signaling theory framework, the management and disclosure of green intellectual capital serve as credible non-financial signals that reflect a company's internal capabilities in managing environmental issues strategically and with a long-term orientation. These signals can reduce information asymmetry between management and investors while fostering positive investor perceptions regarding the company's sustainability prospects and future performance. A number of empirical studies indicate that green intellectual capital has a positive impact on firm value through enhanced reputation, sustainable performance, and market confidence (Holiawati & Aisa, 2025; Manan et al., 2025; J. Putri et al., 2023; Tonay & Murwaningsari, 2022). Thus, the research hypothesis can be formulated as follows:
H2: Green intellectual capital has a significant positive effect on firm value.

Environmental performance describes a company's ability to manage and minimize the negative impacts of its operational activities on the environment through regulatory compliance, emission and waste control, and efficient use of natural resources, which reflect the company's responsibility and operational sustainability (Kholmi, 2022; Pamudya & Sumaryati, 2025). From the perspectives of signaling theory and legitimacy theory, achieving good environmental performance is viewed as a credible non-financial signal because it demonstrates a company's commitment to managing environmental risks while meeting social expectations. This can reduce information asymmetry and strengthen the company's social legitimacy in the eyes of investors and stakeholders (Desriyunia & Machdar, 2025; Ratnawati, 2025). A number of empirical studies indicate that environmental performance has a significant positive effect on firm value through improvements in reputation, market trust, and perceptions of business sustainability (Heriyah, 2025; Kholmi, 2022; Nurmadi Harsa Sumarta, Natasha Milani, 2023; Pamudya & Sumaryati, 2025). Therefore, the following hypotheses are formulated:
H3: Environmental performance has a significant positive effect on firm value.

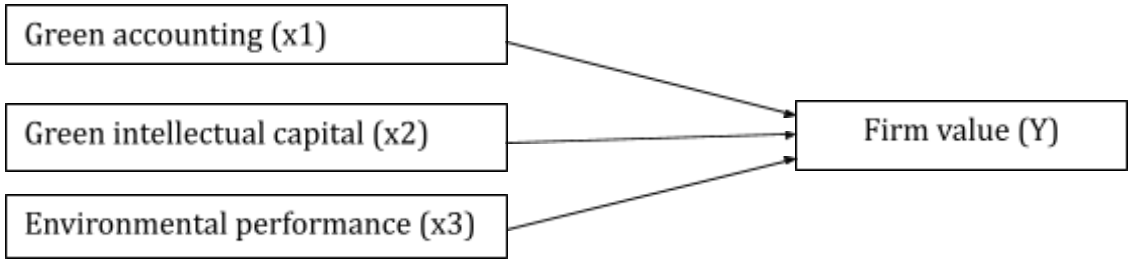

Figure 1. Research model
Source: Research Data, 2026

Method
This research utilizes a quantitative framework featuring a causal-associative design to investigate how Green Accounting, Green Intellectual Capital, and Environmental Performance influence Firm Value within the energy sector. The quantitative approach was selected due to its capacity for empirical validation of variable relationships, producing objective and transferable findings. Secondary data were sourced from annual and sustainability reports of energy sector companies through the Indonesia Stock Exchange platform and company-specific websites covering 2022–2025. The research population comprises all energy sector entities (including coal, oil and gas, and renewable energy) registered on the IDX. Sample selection employed purposive sampling technique based on standards consistent with research aims and comprehensive data accessibility.

Table 1. Sampling Criteria

Num.	Information	Amount
1	Energy-sector companies listed on the 2022–2025 (IDX) for the 2022–2025 period	91
2	Companies that do not have complete annual reports and sustainability reports filed with the Indonesia Stock Exchange (BEI) for the years 2022–2025.	-13
3	Companies that provide data relevant to the research variables.	-61
	Number of companies that can be used in this research	17
	Number of years of research	4

Total sample observed	68

Source: Research Data, 2026

Table 2. Variables and Operational Definitions

Variable	Measurement	Source
Firm value (Y)	PBV = Price per share / Book Value Per Share	(NurRismawanti, 2025)
Green accounting (x1)	GA = (Environmental Cost / Net Profit) x 100%	(Handoko & Santoso, 2023)
Green intellectual capital (x2)	VAIC = $VACA + VAHU + STVA$	(Manan et al., 2025)
Environmental performance (x3)	Company Rankings in PROPER Gold = 5 (Excellent) Green = 4 (Better) Blue = 3 (Good) Red = 2 (Pretty Good) Black = 1 (Bad)	(Deswanto & Siregar, 2018)

Source: Research Data, 2026

Results and Discussion

Table 3. Descriptive Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
Firm Value	68	.38000000	24.440000	3.2091176	4.9088624
Green Accounting	68	.00067974	4.1481418	.12170499	.52954004
Green Intellectual Capital	68	-61.806328	56.723699	10.773254	18.877895
Environmental performance	68	3	5	3.82	.690
Valid N (listwise)	68				

Source: Research Data, 2026

Table 3 presents a descriptive statistical examination based on 68 sample observations. Firm Value (PBV) fluctuates between 0.38 at the lower end and 24.44 at the upper end, with a mean of 3.2091 and standard deviation of 4.9089. The standard deviation exceeding the mean indicates substantial heterogeneity in firm value within the sample. Green Accounting (GA) records a minimum of 0.0007 and maximum of 4.1481 with a mean of 0.1217 and standard deviation of 0.5295. These statistics illustrate that green accounting implementation among energy sector enterprises remains heterogeneous with generally low adoption rates. The Green Intellectual Capital variable (VAIC) presents a minimum of -61.8063 and maximum of 56.7237, yielding a mean of 10.7733 and standard deviation of 18.8779. The higher standard deviation relative to the mean reflects substantial inconsistencies in firms' capacities to develop and utilize environmental intellectual resources. Environmental Performance (PROPER) ranges between 3 and 5 with a mean of 3.82 and standard deviation of 0.690. This mean value indicates that most sampled firms obtained PROPER ratings between Blue and Green categories, signifying adherence to environmental regulations and proactive environmental performance enhancement beyond baseline requirements. Overall findings reveal that PBV, GA, and VAIC demonstrate considerable data variability, while PROPER demonstrates greater consistency with minimal data dispersion.

To examine whether regression residuals are normally distributed, this research conducted normality testing using the one-sample Kolmogorov-Smirnov approach.For improved data distribution and compliance with normality requirements, the sample data underwent transformation via the natural logarithm (Ln). The findings from post-transformation normality assessment are presented below:

Table 4. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		68
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.93647122
Most Extreme Differences	Absolute	.105
	Positive	.105
	Negative	-.057
Test Statistic		.105
Asymp. Sig. (2-tailed)		.059[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
Source: Research Data, 2026

Drawing from the One-Sample Kolmogorov-Smirnov Test applied to 68 observations, an Asymp. Sig. (2-tailed) of 0.059 emerged for the unstandardized residuals. This figure exceeds the designated alpha level of 0.05 (0.059 > 0.05), indicating that residuals from the regression model exhibit normal distribution. Consequently, it can be established that the research data comply with normality requirements. These findings demonstrate that applying logarithmic transformation successfully enhanced the data distribution, rendering the regression model appropriate for subsequent analysis and satisfying one of the core assumptions required during hypothesis testing.

Table 5. Multicollinearity Test Results

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Green Accounting	.964	1.038
	Green intellectual capital	.972	1.029
	environmental performance	.974	1027

a. Dependent Variable: Firm Value
Source: Research Data, 2026

The multicollinearity assessment presented in Table 5 reveals that all predictor variables demonstrate Tolerance values exceeding 0.10 and VIF values below 10.00, including Green Accounting (Tolerance = 0.964; VIF = 1.038), Green Intellectual Capital (Tolerance = 0.972; VIF = 1.029), and Environmental Performance (Tolerance = 0.974; VIF = 1.027). Hence, it can be established that the regression model does not exhibit multicollinearity complications, thereby satisfying the classical assumptions and is appropriate for subsequent analysis.

Table 6. Results of the Heteroscedasticity Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.937	1.155		1.678	.101
	Green accounting	.083	.076	.167	1.090	.282

	Green intellectual capital	.029	.202	.022	.145	.885
	environmental performance	-.695	.590	-.176	-1.178	.245

a. Dependent Variable: ABS_RES
Source: Research Data, 2026

The results of the heteroscedasticity test using the Glejser test with natural logarithmic (ln) transformation in Table 6 indicate that there is no heteroscedasticity issue in the regression model of this study. All independent variables have significance values (Sig.) greater than 0.05, namely Green Accounting with Sig. = 0.282, Green Intellectual Capital with Sig. = 0.885, and Environmental Performance with Sig. = 0.245. Significance values greater than 0.05 for these three independent variables indicate that the residuals in the regression model have constant or homogeneous variance at every level of the predictor variables, thereby satisfying the classical assumption of heteroscedasticity. Thus, transforming the data using the natural logarithm has successfully addressed potential heteroscedasticity in the original data, and the multiple linear regression model used in this study can be deemed valid and safe for use in hypothesis testing and further analysis without concern for bias in parameter estimates.

Table 7. Results of the Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.270[a]	.073	.029	.95817	2.085

a. Predictors: (Constant), environmental performance, Green intellectual capital, Green accounting

b. Dependent Variable: Firm Value

Source: Research Data, 2026

The autocorrelation assessment in Table 7 yields a Durbin-Watson statistic of 2.085, which lies between the range of DU < DW < 4-DU (1.7001 < 2.085 < 2.2999). This demonstrates the absence of both positive and negative autocorrelation in the model, therefore fulfilling the autocorrelation classical assumption. Independent residuals are confirmed and the regression model satisfies the requirements for hypothesis testing.

Table 8. Results of the Multiple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.040	3.382		2.969	.004
	Green accounting	-.471	1.124	-.051	-.419	.677
	Green intellectual capital	-.014	.032	-.053	-.440	.662
	environmental performance	-1.733	.863	-.243	-2.007	.049

a. Dependent Variable: Firm Value
Source: Research Data, 2026

Based on Table 8 above, the following regression model was obtained:

$$Y=10.040-0.471X1-0.014X2-1.733X3+e$$

The regression results indicate that Green Accounting (B = -0.471; Sig. = 0.677) and Green Intellectual Capital (B = -0.014; Sig. = 0.662) have a negative directional effect on firm value; however, these effects are not statistically significant because their significance values exceed 0.05. In contrast, Environmental Performance (B = -1.733; Sig. = 0.049) has a negative and statistically significant effect on firm value. Consequently, only Environmental Performance is demonstrated to influence firm value, while Green Accounting and Green Intellectual Capital do not have significant effects on firm value.

Table 9. Results of the F-Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	104.446	3	34.815	1.476	.230[b]
	Residual	1510.048	64	23.595		
	Total	1614.494	67			

a. Dependent Variable: Firm Value
b. Predictors: (Constant), environmental performance , Green intellectual capital , Green accounting
Source: Research Data, 2026

The F-test findings displayed in Table 9 reveal an F-computed value of 1.476 accompanied by a significance level (Sig.) of 0.230. The corresponding F-table value stands at 2.74 under a 5% significance threshold with degrees of freedom df1 = 3 and df2 = 64. Given that F-computed (1.476) is inferior to F-table (2.74) and the Sig. figure (0.230) exceeds 0.05, the null hypothesis (H_0) receives acceptance while the alternative hypothesis (H_a) experiences rejection. Consequently, in combined effect, Green Accounting, Green Intellectual Capital, and Environmental Performance exert no statistically significant influence on firm value. Such findings demonstrate that these three predictor variables, when evaluated collectively, lack sufficient explanatory power regarding variations in firm value across energy sector enterprises represented in the research sample.

Table 10. Results of the T-Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.040	3.382		2.969	.004
	Green accounting	-.471	1.124	-.051	-.419	.677
	Green intellectual capital	-.014	.032	-.053	-.440	.662
	environmental performance	-1.733	.863	-.243	-2.007	.049

a. Dependent Variable: Firm Value
Source: Research Data, 2026

The t-test examination employing a t-table threshold of 1.99773 demonstrates the following: Green Accounting demonstrates a t-computed value of -0.419 with a significance level of 0.677, whereby |t-computed| < t-table and Sig. > 0.05. This reveals that Green Accounting exerts no statistically significant influence on firm value. The Green Intellectual Capital variable presents a t-computed value of -0.440 with a significance level of 0.662, where |t-computed| < t-table and Sig. > 0.05, suggesting that Green Intellectual Capital similarly lacks significant effect on firm value. Conversely, the Environmental Performance variable produces a t-computed value of -2.007 with a significance level of 0.049, such that |t-computed| > t-table and Sig. < 0.05. Such findings demonstrate that Environmental Performance exerts a negative yet statistically significant influence on firm value. Consequently, in terms of individual effects, Environmental Performance proves influential on firm value, whereas Green Accounting and Green Intellectual Capital demonstrate insignificant effects.

Table 11. Results of the Coefficient of Determination Test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.254[a]	.065	.021	4.857417622451209

a. Predictors: (Constant), environmental performance , Green intellectual capital , Green accounting
Source: Research Data, 2026

The Model Summary table presents an Adjusted R Square coefficient of 0.021. When converted to percentage form (0.021 × 100% = 2.1%), this indicates that Green Accounting, Green Intellectual Capital, and Environmental Performance jointly clarify 2.1% of firm value fluctuations, whereas the remaining percentage (100% - 2.1% = 97.9%) stems from additional factors beyond the research model.

Discussion

The Impact of Green Accounting on Firm Value

The regression analysis results indicate that green accounting has a negative but statistically insignificant effect on firm value (B = -0.471; Sig. = 0.677), leading to the rejection of the first hypothesis. This finding is reflected in the research data, where PT Mitrabara Adiperdana Tbk (MBAP) recorded the highest Green Accounting score in 2025 (GA = 4.148) but had a relatively low firm value (PBV = 0.64). Similarly, PT Perusahaan Gas Negara Tbk (PGAS) reported a Green Accounting score of 1.421, while its PBV was only 0.77. In contrast, PT Bayan Resources Tbk (BYAN) maintained a remarkably high PBV ranging from 19.00 to 19.77 during the 2022–2024 period despite having relatively low Green Accounting scores (0.003–0.009). These findings suggest that a higher level of green accounting implementation does not necessarily lead to an increase in firm value. The results do not support Signaling Theory, which argues that environmental disclosure serves as a positive signal capable of enhancing investor confidence and increasing firm value. The findings also differ from those of (Azzahra, 2022; Muflihah & Pamungkas, 2024), who reported a positive effect of green accounting on firm value, but are consistent with (Z. V Putri & Wardhani, 2025), who found that green accounting has no significant effect on firm value. This condition may be attributed to the fact that during the 2022–2025 period, the energy sector faced pressure from commodity price fluctuations and declining profitability, prompting investors to place greater emphasis on financial performance than on environmental disclosure. Consequently, the implementation of green accounting is still perceived primarily as a regulatory compliance measure and an additional operating cost rather than as a strategic factor capable of enhancing firm value. Therefore, companies should integrate green accounting practices with improvements in operational efficiency and financial performance so that their benefits can be recognized by investors and ultimately reflected in higher firm value.

The Impact of Green Intellectual Capital on Firm Value

The regression analysis results indicate that Green Intellectual Capital (GIC) has a negative but statistically insignificant effect on firm value (B = -0.014; Sig. = 0.662), leading to the rejection of the second hypothesis. This finding is supported by the research data, where PT Perusahaan Gas Negara Tbk (PGAS) recorded the highest VAIC value of 56.724 in 2022, while its firm value (PBV) was only 0.82. Similarly, PT Bumi Resources Tbk (BUMI) reported a VAIC of 47.991 with a PBV of 3.59 in 2022. In contrast, PT Bayan Resources Tbk (BYAN) maintained a remarkably high PBV ranging from 19.00 to 19.77 during the 2022–2024 period despite having relatively lower VAIC values, ranging from 5.43 to 13.31. These findings suggest that a higher level of Green Intellectual Capital does not necessarily lead to an increase in firm value. The results do not support Signaling Theory, which argues that the management of environmentally oriented intellectual assets serves as a positive signal of a firm's ability to create sustainable competitive advantages, thereby enhancing investor confidence. The findings also differ from those of (Manan et al., 2025; Martínez-Falcó et al., 2025), who found that Green Intellectual Capital has a positive effect on firm value, but are consistent with (Ahmad et al., 2025; Shahbaz & Malik, 2025), who concluded that the effect of Green Intellectual Capital on firm value is not statistically significant. This condition may be explained by the fact that during the 2022–2025 period, investors in the energy sector placed greater emphasis on profitability, commodity price prospects, and the company's ability to generate earnings than on long-term investments in human capital development, innovation, and environmentally oriented systems. Moreover, the benefits of Green Intellectual Capital tend to materialize over the long term and may not yet be reflected in stock prices during the study period. Therefore, companies should ensure that the development of Green Intellectual Capital not only strengthens internal capabilities but also generates innovation, operational efficiency, and financial performance that can be directly recognized by investors, thereby contributing to an increase in firm value.

The Impact of Environmental Performance on Firm Value

The regression analysis results indicate that environmental performance has a negative and statistically significant effect on firm value (B = -1.733; Sig. = 0.049). Therefore, the third hypothesis, which proposed a positive effect, is rejected. This finding is reflected in the research data, where PT Perusahaan Gas Negara Tbk (PGAS) consistently received the PROPER Gold rating (5) throughout the 2022–2025 period, yet its firm value (PBV) remained relatively low, ranging from 0.52 to 0.82. Similarly, PT Adaro Energy Indonesia Tbk (ADRO) achieved the PROPER Gold rating (5) during the 2022–2024 period, but its PBV steadily declined from 1.29 to 0.61. In contrast, PT Bayan Resources Tbk (BYAN) received only the PROPER Blue rating (3)

during 2023–2025, yet maintained a remarkably high PBV ranging from 12.83 to 19.77. These findings suggest that companies with better environmental performance do not necessarily have higher firm value.

The results do not support the predictions of Signaling Theory or Legitimacy Theory, both of which argue that strong environmental performance provides a positive signal to investors while enhancing corporate legitimacy, ultimately leading to higher firm value. From the perspective of Signaling Theory, higher PROPER ratings should serve as credible signals that a company effectively manages environmental risks and is committed to long-term sustainability. However, the findings indicate that these signals were not interpreted positively by investors during the observation period. Instead, investors appeared to place greater emphasis on financial fundamentals, such as profitability, earnings prospects, and commodity price movements, than on environmental achievements. Consequently, environmental performance was not sufficiently strong to influence market valuation positively. From the perspective of Legitimacy Theory, although companies with superior environmental performance may strengthen their legitimacy by complying with environmental regulations and meeting stakeholder expectations, such legitimacy does not necessarily translate into higher firm value. This suggests that social and regulatory legitimacy alone is insufficient to generate a positive market response unless it is accompanied by tangible improvements in financial performance and economic benefits.

The findings differ from those of (Cahyanto & Budiman, 2025; Pamudya & Sumaryati, 2025), who reported a positive effect of environmental performance on firm value, but are consistent with (Amarylis & Rosiyana, 2025; Wigiarni & Chandra, 2024), who found that the relationship between environmental performance and firm value remains inconsistent. This condition may be explained by the fact that during the 2022–2025 period, investors in the energy sector placed greater emphasis on profitability, commodity price prospects, and the company's ability to generate earnings than on environmental performance achievements. Furthermore, obtaining higher PROPER ratings requires substantial investments and environmental expenditures, including waste management, emission control, and sustainability programs. In the short term, these expenditures may be perceived as additional operating costs that have not yet contributed to an increase in firm value. Therefore, the findings of this study suggest that the effectiveness of environmental performance as a market signal and as a mechanism for obtaining corporate legitimacy is context-dependent. In Indonesia's energy sector, environmental performance alone was insufficient to increase firm value because investors continued to prioritize short-term financial performance over sustainability-related information. Therefore, companies should demonstrate that investments in environmental performance not only fulfill regulatory compliance but also improve operational efficiency, reduce business risks, and enhance profitability, thereby creating added value that is positively recognized by investors.

Although these findings provide evidence regarding the relationship between environmental performance and firm value, they should be interpreted with caution because the overall regression model has a relatively low explanatory power (Adjusted R^2 = 2.1%). This indicates that most variations in firm value are influenced by other factors beyond the variables examined in this study. Therefore, the findings should not be generalized to all energy companies but should be understood within the context of the sampled firms and the 2022–2025 observation period.

Conclusion

This study concludes that green accounting, green intellectual capital, and environmental performance do not have a statistically significant simultaneous effect on firm value among energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2022–2025 period (F = 1.476; Sig. = 0.230; Adjusted R^2 = 2.1%). Partially, green accounting and green intellectual capital have no significant effect on firm value, whereas environmental performance has a negative and statistically significant effect on firm value. The findings indicate that sustainability-related information has not yet become a primary consideration for investors when evaluating energy sector companies. This is reflected in the sample companies, where firms with higher levels of green accounting implementation, green intellectual capital, or PROPER ratings did not necessarily exhibit higher firm value. These results suggest that investors continue to prioritize fundamental factors, such as profitability, commodity price prospects, and financial performance, over sustainability-related information in their investment decisions. Consequently, the implementation of sustainability practices is still perceived primarily as a form of regulatory compliance and a long-term investment whose economic benefits have not yet been fully reflected in firm value. Therefore, energy sector companies should integrate sustainability practices with improvements in operational efficiency, profitability, and long-term value creation so that their benefits can be recognized by investors and ultimately reflected in higher firm value. This study is subject to several limitations, including the relatively short observation period, the limited sample size, and the low

Adjusted R^2 value, indicating that most of the variation in firm value is explained by factors outside the research model, such as profitability, capital structure, firm size, commodity price fluctuations, and market sentiment. Accordingly, future studies are recommended to extend the observation period, incorporate additional financial and macroeconomic variables, and consider mediating or moderating variables to provide a more comprehensive explanation of the factors influencing firm value.

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