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Green Accounting, Environmental Performance, And Energy Firm Value: The Moderating Role Of ESG

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Abstract

The energy sector is highly sensitive to environmental issues; Consequently, a company's ability to manage environmental impacts and communicate its sustainability commitments has become increasingly relevant to the creation of corporate value. This study aims to analyze the impact of green accounting implementation and environmental performance on corporate value, while also examining the role of Environmental, Social, and Governance (ESG) factors as a moderating variable. A quantitative approach was employed, focusing on energy sector companies listed on the Indonesia Stock Exchange during the 2021–2025 period. A purposive sampling method was used, resulting in a sample of 40 companies and 200 observations. Data analysis was conducted using multiple linear regression and Moderated Regression Analysis (MRA) with the aid of SPSS. The results of the primary model indicate that both green accounting implementation and environmental performance have a positive and significant impact on corporate value. While ESG did not strengthen the impact of green accounting, it did strengthen the impact of environmental performance. However, robustness tests revealed that the influence of environmental performance and the moderating effect of ESG are sensitive to the choice of proxy for corporate value; therefore, interpretations should be made with certain caveats.

Keywords: green accounting, environmental performance, ESG, corporate value, energy sector

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INTRODUCTION

Currently, global warming is a hot topic and a key topic in every discussion and meeting between countries because of its significant impact on the future survival of living things. Many countries are working to prevent and mitigate global warming by issuing policies regarding the business activities of each company, considering that business activity is one of the factors triggering global warming.(Anggriani & Syaipudin, 2025). Increasingly tight industrial competition is making industrial players strive to improve their performance to maintain survival and achieve company goals, namely obtaining maximum profits (Herny & Herawaty, 2024)As a business entity, a company not only seeks profit but also creates value for all parties. One of the primary ways to gauge a company's success is its market value, which is reflected in the company's valuation and reflects the market's view of the company's potential and future performance.(Septiana & Sundari, 2024)A high company value indicates that investors believe in the company's ability to continue to progress and develop, but maintaining that value is not easy, especially in the energy sector which is known to have dynamic and complex characteristics.(Rosalina et al., 2025; Dianty & Nurrahim, 2022).

The energy sector plays a crucial role in national and global economic development. It encompasses various companies selling products and services related to energy extraction, particularly from non-renewable sources such as oil, natural gas, and coal. Therefore, revenues in this sector are highly dependent on global energy commodity prices.(Yuliandhari & Nurramadhani, 2024).



Figure 1. Average Value of Energy Sector Companies 2020-2025

The average value of energy sector companies, as measured by Tobin's Q, fluctuated during the 2020–2025 period. The average value of 1.45 in 2020 decreased

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to 1.07 in 2021, then increased to 1.33 in 2022 before dropping again to 1.18 in 2023. A stronger change occurred in 2024, when the average Tobin's Q reached 2.14, then corrected to 1.91 in 2025. Despite the decline in the last year, this value remains above the 2020–2023 period. This fluctuation illustrates that market valuations of energy sector companies have not moved stably, although in general, a Tobin's Q value above 1 indicates that the market is providing a higher valuation than the value of the company's assets. These dynamics are interesting to study further, especially regarding how environmental and sustainability management contribute to the formation of company value. The data in Figure 1 is the average Tobin's Q of all energy sector companies listed on the IDX as a depiction of general industry trends, while the empirical analysis in the Results and Discussion section uses 40 companies that meet the purposive sampling criteria as explained in the Method section, so the two figures are not identical.

Growing attention to non-financial factors has positioned sustainability practices as an important component of corporate value creation. Green accounting integrates environmental considerations into corporate accounting systems by identifying, measuring, and disclosing environmental costs and benefits, thereby promoting transparency and stakeholder confidence (Salsabila & Widiatmoko, 2022; Harahap & Yuyetta, 2025; Gantino et al., 2023). This relevance is reinforced by PROPER data, which indicate that although Blue-rated companies consistently dominate environmental performance ratings, the number of Red- and Black-rated companies has also increased, highlighting persistent challenges in corporate environmental management (Ministry of Environment, 2026). Empirical evidence regarding the effects of green accounting and environmental performance on firm value, however, remains inconsistent. Several studies report positive effects, whereas others find insignificant or even negative relationships (Delvia & Helmy, 2024; Lestari & Khomsiyah, 2023; Melawati, 2022; Gantino et al., 2023; Harahap & Yuyetta, 2025). These mixed findings suggest that market responses to environmental practices may depend not only on environmental disclosure and performance but also on broader sustainability factors, particularly ESG practices.

Against this background, this study examines the effects of green accounting and environmental performance on the value of energy-sector companies listed on the Indonesia Stock Exchange during 2021–2025, while investigating the moderating role of ESG. The study contributes in three respects: first, by integrating green accounting as a representation of environmental disclosure and commitment with environmental performance as a measure of actual environmental achievement; second, by examining

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ESG as a moderating factor within the Indonesian regulatory context following SEOJK No. 16/SEOJK.04/2021, which strengthened sustainability disclosure requirements for public companies; and third, by focusing on the energy sector, which faces substantial environmental pressures and significant energy-transition challenges. The study is intended as an exploratory contribution to understanding how environmental transparency and performance are reflected in market valuation, while recognizing that firm value is influenced by broader macroeconomic, commodity, geopolitical, and financial factors beyond the proposed model.

LITERATURE REVIEW

Signal Theory

*Signaling theory*explain why companies have an incentive to provide financial reporting information to external parties(Brigham & Houston, 2021)This incentive arises because there is information asymmetry between the company and external parties, because the company knows more about its future conditions and prospects than external parties such as investors and creditors.(Arifin, 2019). Amid growing investor attention to ESG and sustainability issues, signals from green accounting and environmental performance disclosures are becoming increasingly important, no longer simply as a form of compliance, but as a corporate strategy for building value.

Stakeholder Theory

Stakeholder theory assumes that companies run their businesses not only for their own interests, but also for the interests of stakeholders such as investors, government, suppliers, customers, society and the environment.(Sapulette & Limba, 2021)This theory holds that in its production and operations, a company needs to provide benefits and advantages to its stakeholders because a company is not a self-interested entity (Dianty & Nurrahim, 2022). Stakeholder theory explains that green accounting and environmental performance are not just operational practices or regulatory compliance, but part of a company's strategy in meeting stakeholder demands to create value.(Sululing et al., 2024).

Company Values

Company value can be interpreted as the perception of stock investors towards the company, which is often associated with share prices.(Wulandari, 2021)A company's high stock price will lead investors to believe that the company's value is also high. A

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company's primary goal is to maximize wealth or value for the company (value of the firm), because maximizing company value is essentially the same as maximizing shareholder wealth.(Jayanti et al., 2025; Feng & Wu, 2021; Brigham & Houston, 2021).

Green Accounting

*Green accounting*is a concept where companies prioritize efficiency and effectiveness in using resources sustainably, so that they can align company development with environmental functions and provide benefits to society.(Amanda & Mariana, 2025)This approach not only focuses on recording economic activities, but also integrates environmental aspects into the company's accounting system, so that the company can identify, measure, and disclose the costs and benefits related to the environmental impacts of its operational activities.(Lako, 2022).

Environmental Performance

Environmental performance is a company's activity or behavior to participate in preserving the environment and building a healthy and green environment. Environmental performance is the result of all activities undertaken by the company to prevent, control, and manage the negative impacts of its activities on the environment, with a focus on reducing the negative impacts of its activities while maintaining environmental sustainability.(My Lord, 2022).

***Environmental, Social, and Governance*(ESG)**

Environmental, Social, and Governance(ESG) is a standard used by companies in investment practices, where companies integrate and implement their policies in line with environmental, social, and governance concepts (Novirianti, 2020). ESG is a standard used to assess a company's commitment to implementing sustainability principles through environmental, social, and corporate governance aspects. In this study, ESG disclosure is measured using the ESG index, which is a comparison between the number of items disclosed by the company and the total number of disclosure items used as a reference.(Adenina & Sudrajat, 2024;Azahra & Hasnawati, 2024).

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Hypothesis Development

1. The Impact of Green Accounting Implementation on Company Value

*Green accounting*can be viewed as a mechanism that has the potential to increase company value because it reflects the company's commitment to environmental responsibility and business sustainability. According to the signaling theory perspective, disclosing environmental activities through green accounting is a positive signal to investors that the company has good governance, is able to manage environmental risks, and has better long-term prospects (Salsabila & Widiatmoko, 2022;Herny & Herawaty, 2024). The implementation of green accounting encourages operational efficiency through better management of environmental costs, which ultimately has the potential to improve company performance and strengthen the company's value in the market (Erlangga et al., 2021). Research conducted byAtarwaman et al. (2025);Noviyanti (2026);Lestari & Khomsiyah (2023); AndErlangga et al. (2021)proves that the implementation and disclosure of green accounting can improve market perception and positively influence company value because investors perceive the company as having a commitment to sustainability and good risk management. Similarly, research conducted byMirnawati & Dewi (2023);Septiana & Sundari (2024)AndSalsabila & Widiatmoko (2022)which proves that green accounting has an impact on company value.

H1. The implementation of green accounting has a positive effect on company value.

2. The Influence of Environmental Performance on Company Value

Good environmental performance reflects a company's ability to manage environmental impacts while demonstrating a commitment to business sustainability. Referring to signaling theory, good environmental performance is a positive signal to investors and the market that the company has quality management, is able to manage environmental risks, and has better long-term prospects. Viewed from the perspective of stakeholder theory, environmental performance reflects the company's response to meeting the expectations of stakeholders, including the government, the community, and investors, thereby increasing legitimacy, reputation, and stakeholder support, which ultimately contributes to increasing company value (Melvani & Arsjah, 2025)Companies with good environmental performance are seen as more capable of running their businesses responsibly and sustainably. Companies that effectively manage pollution, energy efficiency, waste, and environmental compliance have a lower risk of regulatory

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sanctions, social conflict, and reputational damage, thereby increasing investor confidence (Kusumo & Yuyeta, 2025). The positive influence of environmental performance on company value is supported by previous research, includingSapulette & Limba (2021);Anggriani & Syaipudin (2025);Prasetio & Prijanto (2024);His Lord (2022)AndLestari & Khomsiyah (2023)who found empirical evidence of a positive influence of environmental performance on company value.

H2. Environmental performance has a positive effect on company value.

3. The Effect of Green Accounting Implementation on Company Value with ESG as a Moderating Variable

ESG acts as a factor that strengthens the quality of signals and corporate accountability. Companies with high levels of ESG disclosure tend to be more trusted because they show a more comprehensive commitment to sustainability, so the relationship between green accounting and corporate value becomes stronger.(Pangestu & Khomsiyah, 2025).Postiglione et al. (2024)Through a hybrid literature review, it was found that companies that implement ESG policies receive incentives from the investment community in the form of higher market confidence, which in turn increases stock prices by reducing the risks borne by investors.(Pangestu & Khomsiyah, 2025)This argument is relevant to the context of green accounting, where when companies disclose environmental costs through financial statements, ESG serves as an additional layer of validation that strengthens the signal in the eyes of investors. From a signaling theory perspective,Li et al. (2025)proving that ESG performance is an effective signal for investors, so that the positive relationship between ESG and company value is getting stronger.

H3. ESG strengthens the influence of green accounting implementation on company value.

4. The Influence of Environmental Performance on Corporate Value with ESG as a Moderating Variable

Good environmental performance is a positive signal that a company is able to effectively manage its environmental impacts and is committed to sustainability, thereby increasing investor confidence and market perception of the company. From a stakeholder theory perspective, environmental performance reflects a company's ability to meet stakeholder expectations regarding environmental and social responsibility ((My Lord, 2022)ESG acts as a factor that strengthens the quality of these signals, as it

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reflects a company's level of transparency, governance, and sustainability commitment more comprehensively. Therefore, theoretically, ESG can strengthen the influence of environmental performance on company value. Companies with good environmental performance tend to be more trusted by investors because they are perceived to have lower risks, particularly related to regulatory, reputational, and business sustainability risks. However, this positive impact will be more pronounced when supported by high ESG disclosure, as ESG helps investors understand that good environmental performance is not just a formality, but part of an integrated corporate strategy.Dohrmann et al. (2025)More specifically, it proves that ESG plays a role as a strengthening (moderating) effect of environmental performance on the company's market value, where the significant positive relationship between environmental performance and company value is strengthened by the existence of executive compensation linked to ESG metrics.

H4. ESG strengthens the influence of environmental performance on the value of energy companies listed on the IDX in 2021–2025.

Theoretical Framework of Thought

The conceptual framework in this study was developed to illustrate the relationship between the variables studied. The independent variables consist of green accounting and environmental performance, while the dependent variable is firm value. ESG serves as a moderating variable, strengthening or weakening the relationship between the independent and dependent variables. This framework is designed to analyze how green accounting and environmental performance influence firm value, both directly and through the moderating role of ESG.

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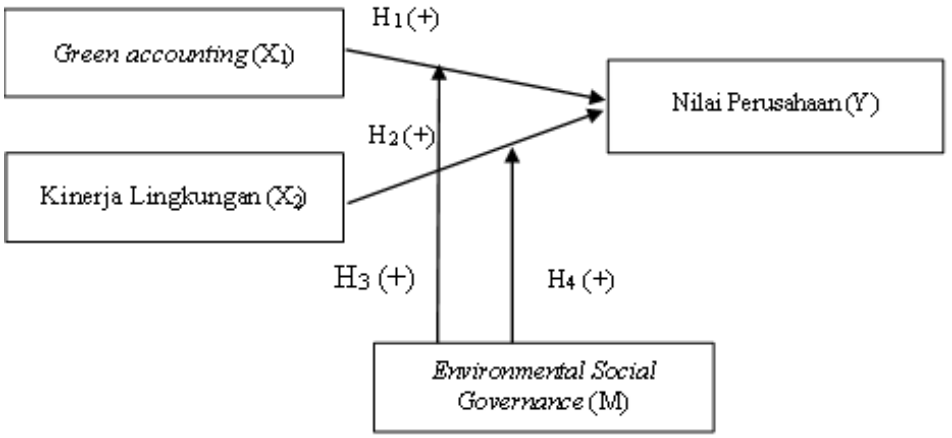


Figure 2 Theoretical Framework of Thought

METHOD

This research is a quantitative study with a descriptive approach. The study population is 40 energy sector companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2025 period. The sample was determined using a purposive sampling technique based on the following criteria: (1) energy companies that report complete annual financial reports as described in the following table:

Table 1. Sample Criteria

Sample Criteria	Amount
Energy companies reporting financial statements in 2021-2025	40
Energy companies that present complete annual financial reports consecutively	40
Energy companies that have complete data according to research variables for the period 2021-2025	40
Energy companies registered as PROPER participants during the 2021-2025 period	40
Amount of research data (5 years x 40 companies)	200

The sample selection results showed that no companies were eliminated at any stage of the screening. All energy sector companies in the study population met all established criteria, from the consistent availability of annual financial reports during the 2021–2025 period, completeness of research variable data, to participation in the

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Corporate Performance Rating Program in Environmental Management (PROPER). This condition aligns with the characteristics of companies listed on the IDX Main Board, which generally have better reporting compliance, governance quality, and information transparency than companies on other boards. Therefore, the entire population of 40 companies was selected as the study sample. During the initial data screening stage, several observations were found with very extreme Tobin's Q values. Consistent with standard procedures for handling outliers in similar studies, observations with values greater than 3 standard deviations from the mean were examined and re-verified against each company's annual report. After verification, these observations were deemed valid (not data entry errors) because they came from energy companies that had experienced significant asset revaluations or had recently gone public, which genuinely had high Tobin's Q. This treatment produces a distribution of Tobin's Q values with a mean of 1.5254 and a standard deviation of 3.86612, which reflects the heterogeneity of market valuations of energy companies.

The data used is secondary data sourced from the annual reports of energy companies listed on the Indonesia Stock Exchange (IDX) for 2021–2025, which can be accessed through www.idx.co.id and each company's official website. Data collection was conducted through documentation, namely by directly quoting and recording necessary data related to the research (Arikunto, 2021). This study involved three types of variables: independent variables (green accounting and environmental performance), dependent variables (firm value), and moderating variables (ESG). Operational definitions of each variable are presented in Table 2.

Table 2. Operational Definitions of Variables

Variables	Definition & Indicators	Scale	Source
Company Value (Y)	Investor perception of the company, measured by Tobin's Q ratio: Q = (EMV + D) / EBV, where EMV = market value of equity, EBV = book value of total assets, D = book value of total debt.	Ratio	Aryani et al. (2023)
Green Accounting (X1)	Measured using dummy variables: 1. Score 1 for companies that disclose environmental cost components,	Dummy	Rosaline and Wuryani (2020)

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Variables	Definition & Indicators	Scale	Source
	waste recycling costs, and environmental R&D costs in the annual report; 2. The value of 0 is used for companies that do not have environmental cost components, waste recycling costs, environmental R&D costs in the company's annual financial report.		
Environmental Performance (X2)	Measured using the PROPER (Ministry of Environment and Forestry) rating: Gold = 5, Green = 4, Blue = 3, Red = 2, Black = 1.	Ordinal	Sapulette and Limba (2021)
ESG (M)	Measured by the ESG disclosure index: ESG Score = number of items disclosed / total disclosure items.	Ratio	Adenine and Sudrajat (2024),Azahra and Hasnawati (2024)

*Green accounting*is measured using a dummy variable based on the presence or absence of environmental cost disclosure, thus reflecting the formal adoption of the practice, but does not yet measure the quality of the disclosure. Meanwhile, ESG is measured using a disclosure index based on the GRI Standards, which consists of 86 items, including 31 environmental, 39 social, and 16 governance items.

Table 3.ESG Measurement Indicators

Category	Sub-items/Aspects	Number of Items	Data source
Environmental	Materials; Energy; Water and Effluents; Biodiversity; Emissions; Waste; Supplier Environmental Assessment	31	*Sustainability Report*and Annual Report

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Social	Employment; Labor/Management Relations; OHS; Training and Education; Diversity and Equal Opportunity; Non-Discrimination; Freedom of Association; Child Labor; Forced Labor; Safety Practices; Indigenous Rights; Human Rights; Local Communities; Supplier Social Assessment; Public Policy; Customer Health and Safety; Marketing and Labeling; Customer Privacy	39	*Sustainability Report*and Annual Report
Governance	Governance; Anti-Corruption	16	*Sustainability Report and Annual Report*
Total		86	

The scoring process is conducted through content analysis of each company's ESG disclosures. Each disclosed item is assigned a score of 1.While items not disclosed are given a score of 0. The scores for all items are then summed and divided by 86, the maximum number of ESG disclosure items. The index value ranges from 0 to 1, with values closer to 1 indicating a more extensive ESG disclosure. Data is obtained primarily from the Sustainability Report, while the Annual Report is used as a supplementary source if ESG information is integrated into the annual report.

Data analysis was conducted through several stages: (1) descriptive statistics to provide an overview of the research variables; (2) classical assumption tests including normality, multicollinearity, autocorrelation, and heteroscedasticity tests to ensure the regression model meets the Best Linear Unbiased Estimator (BLUE) requirements; (3) multiple linear regression analysis to test the direct influence of green accounting and environmental performance on company value; (4) Moderated Regression Analysis (MRA) to test the moderating role of ESG; and (5) model feasibility test (F test) and coefficient of determination (Adjusted R^2). All data processing was carried out with the help of the SPSS program.

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RESULTS AND DISCUSSION

Statistical Description

Table 4. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Standard Deviation
Green Accounting	200	0.00	1.00	0.5400	0.49965
Environmental Performance	200	3.00	5.00	3,7200	0.69572
ESG	200	0.26	0.50	0.3615	0.06176
Company Values	200	0.05	26.23	1.5254	3.86612

Source: SPSS processing results (2026)

The average green accounting score of 0.5400 indicates that 54% of company observations have disclosed environmental costs, while 46% have not, with quite high variation in disclosure. Environmental performance has an average of 3.7200, above the Blue rating, indicating relatively good environmental performance of energy sector companies, with some achieving Green or Gold ratings. The average ESG score of 0.3615 indicates a level of ESG disclosure of around 36.15% and is relatively uniform, but still not optimal. Meanwhile, firm value, proxied by Tobin's Q, has an average of 1.5254, indicating that the market values the company higher than its asset value. However, the standard deviation of 3.86612 indicates a significant variation in firm value between observations.

Classical Assumption Test

A one-sample Kolmogorov-Smirnov normality test on the initial data showed a significance value of 0.000 (<0.05), indicating that the data were not normally distributed. After transforming the data to fractional rank, the retest results showed a significance value of 0.200 (>0.05), indicating that the data were normally distributed.

Table 5. Normality Test Results (Kolmogorov-Smirnov, After Transformation)

Information	Mark
N	200
Test Statistics (KS)	0.039
Asymp. Sig. (2-tailed)	0.200

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Conclusion	Normally distributed data

Source: SPSS processing results (2026)

The multicollinearity test shows that the green accounting variable (X1) has a tolerance value of 0.910 and a VIF of 1.098; environmental performance (X2) has a tolerance value of 0.794 and a VIF of 1.260; while ESG (M) has a tolerance value of 0.842 and a VIF of 1.187. All variables have tolerance values above 0.10 and VIFs below 10, so there are no symptoms of multicollinearity between the predictor variables and the model can proceed to the next stage of analysis.

Table 6. Multicollinearity Test Results

Variables	Tolerance	VIF
Green Accounting (X1)	0.910	1,098
Environmental Performance (X2)	0.794	1,260
ESG (M)	0.842	1,187

Source: SPSS processing results (2026)

The autocorrelation test with Durbin-Watson produces a DW value of 2.024. Based on n = 200 and k = 3 at a significance level of 5%, the dU value is 1.799 so that the 4−dU value is 2.201. The DW value is in the range of dU < DW < 4−dU (1.799 < 2.024 < 2.201), so the model does not experience autocorrelation symptoms, either positive or negative. The heteroscedasticity test with the Glejser test shows that the significance value of all independent variables (green accounting sig. 0.180; environmental performance sig. 0.413; ESG sig. 0.817) is above 0.05, so the regression model is declared free from heteroscedasticity and can be used to predict the influence of independent variables on company value.

Table 7. Glejser Test Results (Heteroscedasticity)

Variables	B	t	Sig.
(Constant)	2,370	3,175	0.002
Green Accounting (X1)	0.400	1,347	0.180
Environmental Performance (X2)	-0.160	-0.820	0.413
ESG (M)	-0.402	-0.231	0.817

Source: SPSS processing results (2026)

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Multiple Regression Analysis and Direct Effect Hypothesis Testing

Table 8. Results of Multiple Regression Analysis and Direct Hypothesis Testing

Variables	B	β	t	Sig.
(Constant)	-3,526	-	-3,205	0.002
Green Accounting (X1)	1,202	0.171	2,432	0.016
Environmental Performance (X2)	1,010	0.234	3,328	0.001

Source: SPSS processing results (2026)

The regression equation formed is $\hat{Y}$ = -3.526 + 1.202X1 + 1.010X2. Green accounting and environmental performance both have a positive effect on company value, with environmental performance having a relatively stronger effect (β = 0.234) compared to green accounting (β = 0.171). The t-test results show that green accounting has a positive and significant effect (t = 2.432; p = 0.016), so H1 is supported, while environmental performance also has a positive and significant effect (t = 3.328; p = 0.001), so H2 is supported.

Moderated Regression Analysis (MRA) Test

Table 9. Moderated Regression Analysis (MRA) Test Results

Variables	B	β	t	Sig.
(Constant)	14,035	-	1,858	0.065
Green Accounting (X1)	-1,931	-0.274	-0.588	0.557
Environmental Performance (X2)	-3,719	-0.863	-1,708	0.089
ESG (M)	-45,262	-1,143	-2,231	0.027
X1×M Interaction	8,897	0.498	1,001	0.318
X2×M Interaction	12,016	1,848	2,098	0.037

Source: SPSS processing results (2026)

The interaction between green accounting and ESG does not significantly affect firm value (t = 1.001; p = 0.318), thus H3 is not supported. Conversely, the interaction between environmental performance and ESG has a positive and significant effect (t =

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2.098; p = 0.037), indicating that ESG can strengthen the influence of environmental performance on firm value, thus H4 is supported.

Model Feasibility Test and Determination Coefficient

Table 10. Model Feasibility Test Results (F Test)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	143,786	3	47,929	9,363	.000b
Residual	1003.282	196	5,119		
Total	1147,068	199			

Source: SPSS processing results (2026)

Based on the results of the goodness of fit model test above, the calculated F value was 9.363 > the F table value was 2.65 with a significance value of 0.000 < 0.05, so it can be concluded that the model in this study is said to be suitable or fit..

Table 11. Results of the Determination Coefficient Analysis

R	R Square	Adjusted R Square	Standard Error of the Estimate
0.354a	0.125	0.112	2.26247

Source: SPSS processing results (2026)

The adjusted R-square value of 0.112 indicates that the green accounting, environmental performance, and Environmental, Social, and Governance (ESG) variables in the research model collectively explain 11.2% of the variation in firm value. Meanwhile, 88.8% of the variation in firm value is explained by factors outside the research model that were not examined in this study.

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Robustness Test (Robustness Check)

Table 12. Robustness Check Results with PBV Alternative Proxy

Connection	β	t	Sig.	PBV Results	Consistency with the Main Model
Green Accounting → Company Values	0.296	3,953	<0.001	Significant positive	Consistent
Environmental Performance → Corporate Value	0.064	0.823	0.412	Not significant	Inconsistent
Green Accounting × ESG Interaction	2,146	4,537	<0.001	Significant positive	Inconsistent
Environmental Performance × ESG Interaction	-0.037	-0.064	0.949	Not significant	Inconsistent

Source: SPSS processing results (2026)

The robustness check results show that the effect of green accounting on firm value remains positive and significant when the firm value proxy is changed from Tobin's Q to PBV, resulting in a relatively consistent relationship. Conversely, the effects of environmental performance and ESG moderation show different results for the two proxies. This finding suggests that some of the relationships, particularly environmental performance and ESG moderation, are sensitive to the choice of firm value proxy. Thus, the robustness check results primarily reinforce the consistency of the effect of green accounting, while the conclusions of the main model remain intact.

DISCUSSION

1. The Impact of Green Accounting Implementation on Company Value

The study results show that the implementation of green accounting has a positive impact on the value of energy sector companies listed on the Indonesia Stock Exchange for the 2021–2025 period. This finding demonstrates that environmental costs are not merely viewed as a corporate burden, but rather as part of efforts to manage environmental risks and maintain operational sustainability. In the energy sector, which is closely linked to the use of natural resources, a company's willingness to allocate and

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disclose environmental costs provides an understanding of its responsibility in managing the ecological consequences of its business activities. This capability can reduce the risk of sanctions, operational disruptions, and reputational pressures, thereby increasing investor confidence in the company's prospects.

These findings align with Stakeholder Theory, which holds that a company's sustainability is determined by its ability to safeguard the interests of various stakeholders. At the same time, Signaling Theory explains that environmental cost disclosure signals a company's transparency, responsibility, and preparedness to address sustainability risks. When this information is perceived as credible, investor uncertainty decreases and the company's valuation increases. These research findings support those of Atarwaman et al. (2025), Noviyanti (2026), Lestari and Khomsiyah (2023), Erlangga et al. (2021), Mirnawati and Dewi (2023), Septiana and Sundari (2024), and Salsabila and Widiatmoko (2022), who found that green accounting positively impacts firm value.

2. The Influence of Environmental Performance on Company Value

The research results show that environmental performance positively impacts company value. Environmental performance, as reflected in the PROPER rating, provides information on a company's ability to manage the ecological impacts of its operational activities. For energy companies, achieving good environmental performance is not only related to compliance but also reduces the risk of sanctions, community conflicts, operational disruptions, and reputational pressures. This strengthens stakeholder trust and provides a basis for investors to assess the company's sustainability more positively.

This mechanism aligns with Stakeholder Theory, as sound environmental management reflects a company's ability to respond to the demands of the government, society, investors, and other stakeholders. In Signaling Theory, the PROPER rating serves as a relatively easily observable signal to the market regarding the quality of a company's environmental management. The better the environmental performance, the stronger the information regarding the company's low environmental risk and sustainability prospects. This finding aligns with Sapulette and Limba (2021), Anggriani and Syaipudin (2025), Prasetio and Prijanto (2024), Gustinya (2022), and Lestari and Khomsiyah (2023), which found a positive effect of environmental performance on company value.

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3. The Effect of Green Accounting Implementation on Company Value with ESG as a Moderating Variable

The results of this study indicate that ESG is unable to strengthen the effect of green accounting implementation on firm value (H3 is not supported). This finding reveals an interesting pattern that requires further exploration. One possible interpretation is that environmental cost disclosure through green accounting already provides a fairly explicit and measurable signal to investors regarding a company's commitment to environmental management. Quantitative information on environmental cost allocation (in financial statements) may be perceived by investors as an objective indicator of corporate responsibility. Therefore, additional information through more descriptive/qualitative ESG disclosures may not provide significant added value that changes investors' perceptions of green accounting signals. However, this finding is contingent on the operationalization of the variables and the temporal/industrial context of the study. The success of ESG as a signal amplifier may depend on: (1) the quality and credibility of green accounting disclosures, (2) the sophistication of investors in investigating environmental information, or (3) market conditions and industry sentiment during the observation period. Further research in different sectors and periods is needed to verify this pattern.

4. The Influence of Environmental Performance on Corporate Value with ESG as a Moderating Variable

The results show that ESG can strengthen the influence of environmental performance on firm value (H4 is supported). This significant moderation pattern indicates an interesting difference in mechanism compared to the green accounting-ESG relationship (H3). Environmental performance reflected through the PROPER rating provides objective evidence of a company's ability to manage ecological impacts. However, the PROPER rating (ordinal scale 1-5) may require a broader interpretive context for investors to fully understand its implications for the company's long-term sustainability. ESG disclosure provides a narrative frame that links environmental achievements (PROPER) with the company's social strategy and governance holistically. When a good PROPER rating is accompanied by comprehensive ESG disclosure, investors gain an integrated picture that environmental management is not merely formal compliance, but part of a coordinated sustainability strategy. This finding aligns with Stakeholder Theory: the combination of actual environmental achievements (PROPER) and sustainability transparency (ESG) strengthens stakeholder legitimacy

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and trust. However, the robustness check results indicate that this moderating effect is sensitive to the choice of firm value proxies, requiring caution in interpretation.

CONCLUSION

Conclusion

This study demonstrates that environmental aspects have become part of the value formation of companies in the energy sector in Indonesia. The implementation of green accounting and environmental performance were found to have a positive and significant effect on company value in the main model, indicating that the market appreciates companies that are able to integrate environmental responsibility into their business activities. The role of ESG as a moderator is selective. ESG is unable to strengthen the effect of green accounting on company value, but it is able to strengthen the effect of environmental performance on company value. These findings indicate that the value of ESG information depends not only on the extent of disclosure, but also on its ability to provide context and additional information on a company's sustainability achievements. It should be noted that the robustness test results show that the direct effect of green accounting on company value is relatively consistent across two company value proxies (Tobin's Q and PBV), while the influence of environmental performance and the moderating effect of ESG are still sensitive to the choice of proxy, so interpretation of both findings requires caution. These findings indicate that the results of the study in H2 and H4 should be interpreted as exploratory findings that require validation across different periods and sectors, rather than as evidence that can be broadly generalized.

Suggestion

Energy companies need to strengthen the implementation of green accounting through more transparent and measurable disclosure of environmental costs and improve environmental performance through emission control, waste management, resource efficiency, and improved PROPER (Proper) performance. ESG disclosures should be directed toward substantive information that links environmental achievements to the company's sustainability strategy. Regulators need to improve the standardization and comparability of environmental cost and ESG disclosures to make sustainability information more readily available to the market. Investors can also complement their financial analysis with green accounting, PROPER, and ESG

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information to obtain a more comprehensive picture of a company's environmental risks and long-term prospects.

Research Limitations

This study uses ordinary least squares (OLS) regression on a panel data structure (40 companies × 5 years = 200 observations). Although classical assumptions have been tested for normality, multicollinearity, autocorrelation (Durbin-Watson), and heteroscedasticity (Glejser test), no clustering at the company level or implementation of a fixed/random effects model, which is more appropriate for panel data, was performed. This study is limited by the model's ability to explain variations in company value, which is still relatively low, considering that the value of energy sector companies is also influenced by factors outside the model such as macroeconomic conditions, market sentiment, geopolitical dynamics, energy commodity prices, government policies, and the company's financial and operational conditions. The sample characteristics are limited to energy sector companies that meet the research criteria, including participating in PROPER and being listed on the main board of the IDX, which also tends to represent relatively established companies. Furthermore, the observation period of 2021–2025 makes the research findings inherent in industry characteristics and market dynamics during that period, so generalizations to different sectors and periods require caution. Future research could expand the model by incorporating financial determinants and firm characteristics, using more comprehensive measures of green accounting and environmental performance, and utilizing standardized ESG scores or ESG ratings to test the consistency of the relationship patterns found in this study.

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