

THE INFLUENCE OF GREEN ACCOUNTING ON FIRM VALUE: GOOD CORPORATE GOVERNANCE AS A MODERATING VARIABLE

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Abstract

This study examines the effect of green accounting on firm value, with Good Corporate Governance (GCG) as a moderating variable, and develops the Green Accounting Implementation Evaluation Model (MEIGA). The study addresses limited empirical evidence regarding the moderating role of GCG mechanisms in the relationship between green accounting and firm value in Indonesian energy-sector companies, as well as the need for a practical evaluation tool. A quantitative approach was employed using secondary data from financial statements, annual reports, and sustainability reports of 28 energy-sector companies listed on the Indonesia Stock Exchange during 2023–2025, resulting in 84 firm-year observations selected through purposive sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with WarpPLS 8. The results show that green accounting has a positive and significant effect on firm value ($\beta = 0.39$, $p < 0.01$). Managerial ownership significantly strengthens this relationship ($\beta = 0.70$, $p = 0.01$), whereas institutional ownership ($\beta = 0.05$, $p = 0.20$) and independent commissioners ($\beta = 0.04$, $p = 0.30$) do not demonstrate significant moderating effects. MEIGA was developed by combining green accounting and GCG scores using empirical path-coefficient weights derived from the structural model. The average MEIGA score is 0.163, classified as low under the predefined assessment criteria. This finding indicates limited implementation among sampled companies according to the proposed model. MEIGA offers an initial empirical basis for evaluating implementation and identifying improvement priorities, although further validation is needed to establish its broader applicability.

Keywords: Green accounting, Good Corporate Governance, Firm Value, MEIGA

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1. Introduction

The development of Indonesia's energy industry faces complex challenges in balancing economic growth with environmental responsibility and sustainability. Energy sector companies—whether in mining or oil and gas—have a significant environmental impact through carbon emissions, natural resource consumption, and potential ecosystem damage. Consequently, the implementation of green accounting has become a crucial instrument for aligning financial reporting with environmental considerations (Yani & Wijaya, 2024).

In the context of accounting, the principle of sustainability is realized via the practice of eco-friendly accounting. Green accounting is a financial record approach that goes beyond merely recognizing and recording economic transactions; it also takes into account the environmental consequences of corporate activities. By implementing green accounting, companies are expected to transparently measure, record, and report ecological expenses—like for recovery, reclamation, and contamination management—as well as other environmental obligations. This scope extends beyond the environmental expense borne by the company to include the economic benefits derived from environmental conservation efforts (Harahap & Yuyetta, 2025). Wulandari et al (2024) concluded that the execution of green accounting greatly affects corporate financial performance, thereby establishing a connection between ecological accounting methods and business performance. However, the implications of green accounting for firm value may vary across companies, depending on how environmental costs are managed, reported, and perceived by investors. Therefore, the relationship between green accounting and firm value requires further empirical examination, particularly in industries with substantial environmental impacts.

Company value is a strategic indicator reflecting investor views of a firm's success and possibilities, typically manifested in stock price movements (Nugroho & Dewi, 2025). Amidst rising sustainability consciousness, investors no longer evaluate a company solely based on economic outcomes as well as consider ecological, social, and governance (ESG) dimensions. Research by Yan & Rahmawati (2025) reveals that ESG disclosure has become a decisive factor in investment decisions, particularly within sectors that have significant ecological impacts, like the energy industry. Findings by Wijaya et al (2024) indicate that environmental accounting method can improve company worth via various mechanisms. However, good corporate governance (GCG) is another element

that can affect the value of a company. Nevertheless, the findings of previous studies do not consistently establish whether environmental accounting practices lead to higher firm value. These differences highlight the importance of examining the relationship within specific industrial contexts, particularly the energy sector, where environmental costs and sustainability-related information may be relevant to corporate valuation. Further empirical evidence is therefore needed to clarify this relationship in Indonesian energy-sector companies.

Good Corporate Governance (GCG) is an essential component in driving the effective implementation of green accounting. Through GCG, the concept of openness, accountability, and environmental responsibility can be consistently integrated into corporate decision-making processes and financial reporting. Adinegara & Herliansyah (2023) explain that GCG implementation – proxied by the Corporate Governance Index, ownership by institution, and ownership by management – influences a company's market value. These results suggest that the quality of company governance contributes to shaping market perceptions of firm value. A sound corporate governance structure can either enhance or diminish the connection between green accounting practices and company value, allowing GCG to serve as a mediating factor. Research by Putri et al (2024) demonstrates that effective corporate governance implementation strengthens the beneficial effect of environmentally-oriented accounting practices on improving a firm's financial results. Findings by Zulaeha et al (2025) indicate that the combination of green accounting, CSR, and GCG significantly influences profitability. Research by Handoko & Santoso (2023) reinforces this argument by demonstrating that green accounting and ecological performance affect economic outcomes, accompanied by social accountability acting as an intermediary variable. Therefore, GCG has the potential to moderate the impact of eco-friendly accounting on company worth. However, the effectiveness of corporate governance in supporting the relationship between green accounting and firm value may depend on the specific governance mechanism involved. Institutional ownership, independent commissioners, and managerial ownership represent distinct mechanisms of oversight and managerial alignment, and their moderating effects may therefore differ. Examining these mechanisms separately can provide a more detailed understanding of the role of corporate governance in the relationship between green accounting and firm value.

Previous empirical studies have reported inconsistent findings regarding the relationship between green accounting and firm value, while the moderating roles of institutional ownership, independent commissioners, and managerial

ownership remain insufficiently understood, particularly in Indonesia's energy sector. To address this gap, this study examines the effect of green accounting on firm value and separately investigates the moderating effects of these three GCG mechanisms in energy-sector companies listed on the Indonesia Stock Exchange during 2023–2025. In addition, the study develops the Green Accounting Implementation Evaluation Model (MEIGA) as an applied research output that integrates green accounting and GCG scores using empirical path-coefficient weights derived from the structural model. MEIGA is intended to provide an initial framework for evaluating implementation levels and identifying areas for improvement, rather than serving as an additional variable in hypothesis testing. Accordingly, this study contributes sector-specific empirical evidence on the relationship between green accounting and firm value, clarifies the distinct moderating roles of GCG mechanisms, and introduces an empirically informed evaluation framework that requires further validation.

This study integrates signaling theory, stakeholder theory, and agency theory to explain the relationship between green accounting and firm value and the moderating role of Good Corporate Governance (GCG). These theories provide complementary explanations of the proposed research model. Signaling theory explains how environmental accounting information can influence investors' perceptions and firm valuation. Stakeholder theory explains why companies implement and communicate environmental responsibilities to maintain stakeholder trust and support long-term business sustainability. Agency theory, in turn, explains how corporate governance mechanisms may influence the effectiveness of green accounting in creating firm value by monitoring managerial decisions and aligning managerial interests with those of shareholders.

The integration of these theories provides a comprehensive theoretical foundation for the proposed relationships. Green accounting represents the environmental information and practices that may contribute to firm value, while GCG represents the governance mechanisms that may strengthen the relationship between green accounting and firm value. However, the effectiveness of these mechanisms may differ depending on their respective monitoring functions, independence, and alignment of interests. Accordingly, institutional ownership, the proportion of independent commissioners, and managerial ownership are examined separately as moderating variables.

Signaling theory

Signaling theory explains how companies communicate information about their condition, performance, and future prospects to external parties, particularly investors. Because corporate management generally possesses more detailed information about company operations than external investors, information disclosure plays an important role in reducing information asymmetry. In this context, green accounting can provide a signal regarding a company's commitment to environmental responsibility and its ability to identify, manage, and account for environmental costs and risks (Harahap & Yuyetta, 2025; Yani & Wijaya, 2024).

For companies in the energy sector, environmental information is particularly relevant because their operational activities may involve substantial resource consumption, emissions, reclamation costs, and other environmental obligations. The systematic recognition and disclosure of environmental costs may help investors assess whether a company incorporates environmental considerations into its financial and operational decisions. When investors interpret such information as evidence of responsible environmental management and improved risk awareness, green accounting may contribute to more favorable market perceptions and higher firm value.

Signaling theory also provides a basis for understanding the moderating role of GCG. Environmental information may not generate the same market response across companies because investors also consider the credibility of corporate information and the effectiveness of internal oversight. Institutional shareholders may strengthen monitoring and encourage credible environmental reporting, while independent commissioners may contribute to the reliability of corporate oversight. Managerial ownership may further strengthen the signal when managers who hold shares have incentives to maintain the company's long-term value. Thus, GCG mechanisms may influence how effectively green accounting practices translate into investor confidence and firm value, although the strength of this effect may differ across mechanisms.

Stakeholder theory

Stakeholder theory posits that corporate responsibility extends beyond shareholders to encompass all parties involved, such as staff, clients, the community, and the surroundings. Based on Handoko & Santoso (2023), companies must maintain positive relationships with stakeholders to ensure business continuity. Furthermore, the execution of environmental accounting

acts as a type of corporate responsibility toward stakeholders, particularly regarding environmental aspects. Adopting green accounting shows that an organization is not about profit-oriented but additionally considers the social and environmental impacts of its operations. Energy companies that implement green accounting show concern for the long-term interests of stakeholders rather than focusing exclusively on financial gain (Zulaeha et al., 2025). Through the adoption of green accounting, businesses can enhance their legitimacy and positive image among stakeholders, thereby potentially increasing firm value. Additionally, GCG can enhance the connection between green accounting and company value by enhancing transparency, accountability, and oversight of corporate policies.

Agency theory

Agency theory explains the connection between a principal and an agent, wherein the head administrator—typically a shareholder—grants power to the representative (manager) to manage the company in accordance with the principal's interests. Jensen & Meckling (1976) define agency theory as a agreement between shareholders (principals) and managers (agents) in which the principal delegates power to the agent to conduct business operations. Conflicts of interest frequently arise in agency relationships due to divergent goals between the principal and the agent. As the party managing the company, management possesses more information than shareholders, potentially leading to information asymmetry. Consequently, oversight mechanisms—specifically Good Corporate Governance (GCG)—are required to ensure management operates the company in the best concern of the shareholders. Sastrawan et al (2022), agency theory posits that management must fulfill its duties to serve shareholder interests; thus, GCG is involved in a pivotal function in boosting company worth, fostering investor confidence, and regulating organizational relationships. In this research, GCG—represented by institutional ownership, the board of commissioners, and managerial ownership—serves to oversee corporate policies, including the execution of green accounting. Adopting green accounting mirror a firm's environmental responsibility and can boost investor confidence. Effective GCG implementation enhances oversight of green accounting practices, resulting in greater transparency in corporate disclosures and ultimately increasing firm value.

Green accounting

Green accounting refers to an accounting concept used to record, assess, and reveal the expenses and environmental impacts associated with a company's operational activities. Its implementation goes beyond financial aspects, also addressing resource utilization, waste management, emissions, energy consumption, and corporate environmental responsibility. According to Wijaya et al (2024), green accounting assists companies in providing information regarding environmental activities, thereby fostering transparency with stakeholders. For companies in the energy sector, implementing green accounting is crucial, given the significant risk of environmental damage associated with their operations. Yani & Wijaya (2024) note that environmental accounting helps companies manage environmental impacts more effectively while simultaneously enhancing their company reputation in the view of the public and shareholders. By implementing environmental accounting, firms can show their dedication to eco-friendly practices, thereby boosting stakeholder trust and potentially increasing corporate value.

The Effect of Green Accounting on Firm Value

Green accounting refers to the identification, measurement, recording, and disclosure of environmental costs and activities associated with corporate operations. Its implementation enables companies to incorporate environmental considerations into accounting information and communicate their environmental responsibilities to stakeholders (Wijaya et al., 2024).

Drawing on signaling theory, green accounting may provide investors with information about a company's environmental risk management and commitment to sustainability. From the perspective of stakeholder theory, it reflects the company's consideration of environmental and social responsibilities that may influence stakeholder trust and corporate reputation. When such practices are perceived as credible and relevant to future corporate performance, they may contribute to favorable market assessments. Empirical studies by Harahap & Yuyetta (2025) and Yani & Wijaya (2024), and Wijaya et al. (2024) provide relevant evidence concerning the relationship between green accounting or environmental accounting practices and firm value. Building on these theoretical arguments and prior findings, this study proposes the following hypothesis:

H1: Green accounting has a positive impact on the firm value of companies within the energy sector.

The Influence of Green Accounting on Firm Value: Good Corporate Governance (Proxied by Institutional Ownership) as a Moderating Variable

Institutional ownership represents the proportion of company shares held by institutional investors. From an agency theory perspective, institutional shareholders may monitor management and influence corporate decisions to protect their investment interests. When institutional investors actively evaluate environmental risks and the quality of environmental reporting, their monitoring may encourage more accountable green accounting practices and increase the credibility of information available to the market.

Signaling theory further suggests that effective institutional monitoring may strengthen investors' confidence in environmental information, while stakeholder theory indicates that institutional investors may encourage management to address environmental responsibilities that are relevant to long-term business sustainability. However, institutional investors differ in their investment objectives and environmental priorities. Consequently, a higher proportion of institutional ownership does not automatically imply stronger monitoring of environmental accounting practices. Previous research by Putri et al (2024) examines the moderating role of GCG mechanisms in the relationship between green accounting disclosure and financial performance.

This provides a relevant basis for examining governance as a contextual factor in the effects of green accounting. Institutional investors possess the capabilities and resources to evaluate the application of eco-friendly accounting in greater depth. Adinegara & Herliansyah, 2023) explain that institutional ownership can encourage management to take a more serious approach to implementing sustainable business practices, including green accounting. (Zulaeha et al., 2025) found that GCG, including institutional ownership, positively influences the profitability of energy sector companies that have implemented green accounting. Thus, the second hypothesis is:

H2: GCG (proxied by institutional ownership) enhance the positive influence of green accounting on the company value of energy sector companies.

The Influence of Green Accounting on Firm Value: Good Corporate Governance (Proxied by the Independent Board of Commissioners) as a Moderating Variable

Independent commissioners constitute an oversight mechanism intended to support objective supervision of management. Under agency theory,

independent oversight may reduce managerial opportunism and encourage decisions that protect shareholder interests. In relation to green accounting, independent commissioners may strengthen the implementation and disclosure of environmental costs by promoting accountability and scrutinizing management's environmental decisions.

Stakeholder theory suggests that effective independent oversight may also encourage management to consider the interests of stakeholders affected by corporate environmental activities. From a signaling perspective, credible oversight may enhance confidence in the reliability of environmental information communicated to investors. However, the proportion of independent commissioners does not necessarily reflect their competence, substantive independence, or involvement in environmental and sustainability issues. The extent to which this mechanism strengthens the relationship between green accounting and firm value is therefore an empirical question. Research by Nasution et al (2023) examines the relationship between GCG implementation and firm value, while Putri et al. (2024) provides a relevant reference for considering governance mechanisms in the relationship between green accounting disclosure and corporate outcomes. Thus, the third hypothesis is:

H3: GCG proxied by the independent board of commissioners, strengthens the positive impact of environmental accounting on the firm worth of companies in the energy sector

The Influence of Green Accounting on Firm Value: Good Corporate Governance (Proxied by Managerial Ownership) as a Moderating Variable

Managerial ownership refers to the proportion of company shares held by members of management, including directors and commissioners, according to the measurement adopted in this study. Agency theory suggests that managerial ownership can reduce conflicts of interest by linking managers' financial interests to the economic consequences experienced by shareholders. This alignment may encourage managers to consider long-term corporate value when making decisions involving environmental costs and green accounting implementation.

From a signaling perspective, managerial ownership may strengthen the relationship between green accounting and firm value when managers have incentives to maintain credible environmental reporting and demonstrate responsible management of environmental risks. From a stakeholder perspective, managers who have a financial interest in the company may also

have stronger incentives to preserve long-term business continuity by addressing environmental responsibilities and maintaining stakeholder confidence. Nevertheless, the extent of this alignment depends on the level of managerial ownership and the incentives associated with it. Managerial ownership does not automatically eliminate agency conflicts, but it may provide an incentive mechanism that encourages decisions consistent with long-term shareholder interests. (Adinegara & Herliansyah, 2023) provide relevant evidence concerning the relationship between managerial ownership and market value. Therefore, this study proposes the following hypothesis

H4: GCG proxied by managerial ownership, strengthens the positive impact of green accounting on the company value of energy sector companies.

2. Research Method

This study utilizes a numerical method using causal-associative approach, striving to examine the impact of environmental accounting on firm worth, with GCG as a moderating factor, companies in the energy sector traded on the Indonesia Stock Exchange (IDX) for the 2023–2025. This research utilizes secondary data in the shape of yearly reports and sustainability documents acquired from the official websites of the Indonesia Stock Exchange (IDX) and the respective companies. According to Sugiyono (2024), secondary data refers to data acquired from existing gathered sources by other parties. The population consists of every energy industry firm registered on the Indonesia Stock Exchange throughout the 2023–2025 period. The research sample was chosen using the purposive sampling technique founded on established criteria. Companies reporting negative net income during the observation period were excluded because the operational measurement of green accounting in this study is defined as environmental costs divided by net income. Although this ratio can be mathematically calculated when net income is negative, the resulting value may complicate the economic interpretation and comparability of the green accounting measure across companies. Therefore, the exclusion criterion was applied to maintain consistency in the interpretation of the operational measure. The research sample is shown in Table 1.

Table 1. Research Sample

No	Criteria	Number of Companies
1	Energy sector firms listed on IDX for the 2023-2025 interval	74
2	firms not listed for the consecutive periods of 2023-2025	(7)

3	The companies are not publishing complete annual report and sustainability reports for the 2023-2025 period	(6)
4	Companies experiencing losses (negative earning)	(5)
5	Companies without managerial ownership	(8)
6	Companies that do not explicitly present or disclose environmental costs for the 2023-2025 period	<u>(20)</u>
7	Final Sample	28
8	Year of Observation	3
9	Total research sample (28 x 3)	84

Source: researcher data, 2026

Operational Definitions and Variable Measurement

Green Accounting (X1)

Green accounting refers to form accounting implementation that incorporates environmental expenses and activities into environmental costs and tasks into corporate reporting systems as a tangible manifestation of corporate responsibility regarding environmental impacts. Environmental costs are derived from a company's annual or sustainability reports and are measured using ratios, rather than a checklist-based disclosure score. Environmental costs include expenses related to waste treatment, pollution control, and environmental reclamation and restoration. Handoko & Santoso (2023) state that the measurement of the green accounting variable utilizes the following formula:

$$\text{Green Accounting} = \frac{\text{Environmental Costs}}{\text{Net Profit}}$$

Institutional Ownership (Z1)

Institutional ownership signifies the portion of a company's shares owned by investment firms that contribute to monitoring management. Kartikasari et al., (2022) state that institutional ownership variable is measured using the following formula:

$$IO = \frac{SI}{TS} \times 100\%$$

Note:

IO = Institutional Ownership

SI = Number of Shares Held by Institutions

TS = Total Shares Outstanding of the Company

Independent Board of Commissioners (Z2)

An independent board of commissioners consists of members drawn from outside the company who have no ties to management, thereby ensuring objective oversight. Pardede & Annisa (2023) the independent board of commissioner variable can be measured using the following formula:

$$IBoC = \frac{KI}{TK} \times 100\%$$

Note:

IBoC = Independent Board of Commissioners

KI = Number of Independent Board of Commissioners members

TK = Total number of Board of Commissioners members

Managerial Ownership (Z3)

Managerial ownership pertains to the percentage of shares held by a company's management including directors and commissioners reflecting the degree of alignment regarding management matters, as the company's operators, and the shareholders. (Kartikasari et al., 2022) state that the managerial ownership variable is measured using the following formula:

$$MO = \frac{SM}{TS} \times 100\%$$

Note:

MO = Managerial Ownership

SM = Number of shares held by the company's management

TS = Total Shares Outstanding

Firm Value (Y)

The value of a firm-reflect the market's assessment of a company's achievement, reflected in stock price movements and overall corporate performance. Purbaningsih (2024) state that the firm value variable is measured using the following formula:

$$Tobin'Q = \frac{MVE+D}{TA}$$

Note:

Tobin's Q = Firm Value

MVE = Market Value of Equity

TA = Total Assets

The development of the Green Accounting Implementation Evaluation Model (MEIGA)

One of the applied outputs of this research is the development of the Green Accounting Implementation Evaluation Model (MEIGA). This model serves to give a summary of the level of environmental accounting implementation based on the study's empirical findings. MEIGA is not a research variable used in hypothesis testing; rather, it functions as an applied output designed to translate PLS-SEM results into an evaluative measure. Drawing on Rahadi, (2023), path coefficients demonstrate the direction and intensity of relationships between constructs, allowing them to serve as empirical weights.

Methodological Basis and Model Construction

The development of MEIGA follows a weighted composite index approach, in which the contributions of Green Accounting and Good Corporate Governance are combined using empirically derived weights. The selection of these components is based on the consideration that green accounting practices represent the environmental accounting dimension, while corporate governance provides an organizational governance dimension relevant to the implementation and oversight of such practices.

The model was constructed through three main stages. First, the Green Accounting Score (GAS) and Good Corporate Governance Score (GCGS) were calculated by obtaining the arithmetic mean of the respective scores across all observed companies. Second, the structural path coefficients obtained from the WarpPLS analysis were used as empirical weights to represent the relative contributions of GA and GCG within the estimated structural model. Third, the mean scores were multiplied by their corresponding coefficients and aggregated to produce the MEIGA composite score. Following the weighted composite approach, MEIGA is formulated as follows:

$$\text{MEIGA} = (\text{GAS} \times \beta_{\text{GAS}}) + (\text{GCGS} \times \beta_{\text{GCGS}})$$

Information:

MEIGA = Green Accounting Implementation Evaluation Model score

GAS = Green Accounting Score

GCGS = Good Corporate Governance Score

β_{GAS} = Green Accounting Path Coefficient Estimation Results

β_{GCGS} = Good Corporate Governance Path Coefficient Estimation Results

The use of path coefficients as weights provides an empirically informed approach to constructing the composite measure. Nevertheless, these coefficients represent estimated structural relationships rather than direct measures of implementation intensity. Therefore, MEIGA is interpreted as a proposed empirically weighted evaluation index, and its application beyond the present sample requires further validation. The MEIGA score as a measure of green accounting implementation based on specific assessment categories.

The classification of MEIGA scores was established using an equal-interval approach. Considering that the Green Accounting and Good Corporate Governance scores range from 0 to 1. This range was divided into three equal intervals, the formula would be:

$$Interval = \frac{Maximum - Minimum}{Category}$$

Thus, we obtain A MEIGA score < 0.333 is classified as low, 0.333–0.666 as moderate, and > 0.666–1 as high. These thresholds represent a descriptive classification based on the theoretical range of the proposed composite index.

Calculation of the MEIGA Score

The calculation of MEIGA is based on the average GA and GCG scores obtained from the observed companies. The mean Green Accounting Score was 0.167, while the mean Good Corporate Governance Score was 0.372. These values were multiplied by their corresponding empirical coefficients of 0.39 and 0.26. The resulting composite score is approximately 0.163. The calculation demonstrates how the observed average scores and estimated structural coefficients jointly contribute to the MEIGA value. Although Green Accounting has a higher path coefficient than Good Corporate Governance, the GCG component makes a larger absolute contribution to the composite score because its observed mean score is higher.

Furthermore, the model estimation results served as the basis for developing the Green Accounting Implementation Evaluation Model (MEIGA). MEIGA is not treated as a research variable and is not utilized in hypothesis testing. Instead, the model represents an applied output constructed from the study's empirical findings to give summary of the level of environmental accounting implementation within energy sector companies.

3. Result and Discussion

Results

Each latent variable is measured by a single indicator calculated from secondary data: green accounting (X) is the ratio of environmental costs to net profit, institutional ownership (Z1), independent commissioners (Z2), and managerial ownership (Z3) are percentages, and firm value (Y) is Tobin's Q. The interaction terms ($Z1 \times X$, $Z2 \times X$, and $Z3 \times X$) are likewise single-item product terms generated by WarpPLS. Because each construct is identical to its indicator, WarpPLS fixes the loading at 1.000 and therefore reports AVE, composite reliability, and Cronbach's alpha of 1.000 (Tables 2 and 4). These values result from the single-indicator specification and do not indicate high internal consistency, as there are no multiple items whose shared variance can be assessed (Hair et al., 2022). The conventional criteria (loading ≥ 0.70 , AVE > 0.50 , composite reliability and Cronbach's alpha > 0.70) are therefore not informative and are reported for completeness only. Measurement adequacy instead relies on the objective, ratio-based operationalization adopted from previous studies and on the discriminant validity and collinearity assessment in Table 3.

Table 2. Indicator Loadings and AVE of the Single-Indicator Constructs

No	Latent variable	Loading	AVE	Remarks
1	Green Accounting (X)	1.000	1.000	Fixed (single item)
2	Institutional Ownership (Z1)	1.000	1.000	Fixed (single item)
3	Independent Board of Commissioners (Z2)	1.000	1.000	Fixed (single item)
4	Managerial Ownership (Z3)	1.000	1.000	Fixed (single item)
5	Firm Value (Y)	1.000	1.000	Fixed (single item)
6	Interaction $Z1 \times X$	1.000	1.000	Fixed (single item)
7	Interaction $Z2 \times X$	1.000	1.000	Fixed (single item)
8	Interaction $Z3 \times X$	1.000	1.000	Fixed (single item)

Source: researcher data, 2026

Table 2 shows that the loading and AVE of every construct are 1.000. This outcome does not mean that the indicators were estimated to exceed the 0.70 benchmark; it follows directly from the one-indicator-per-construct design, in which the construct and its indicator are identical. Likewise, the significance of the loadings reported by WarpPLS ($P < 0.001$ for all constructs) has no diagnostic value. Convergent validity in the conventional multi-item sense therefore cannot be tested in this study, and the indicators are treated as direct measures of their constructs.

Table 3. Discriminant Validity: Correlations among Latent Variables, $\sqrt{\text{AVE}}$, and Full Collinearity VIF

	X	Z1	Z2	Z3	Y	$Z1 \times X$	$Z2 \times X$	$Z3 \times X$
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Green Accounting (X)	1.000	-0.114	0.110	0.239	0.242	0.098	0.136	-0.223
Institutional Ownership (Z1)	-0.114	1.000	-0.212	-0.671	-0.333	0.180	-0.055	-0.387
Independent Commissioners (Z2)	0.110	-0.212	1.000	0.226	0.274	-0.062	-0.054	0.214
Managerial Ownership (Z3)	0.239	-0.671	0.226	1.000	0.611	-0.351	0.169	0.607
Firm Value (Y)	0.242	-0.333	0.274	0.611	1.000	-0.323	0.173	0.593
Z1×X	0.098	0.180	-0.062	-0.351	-0.323	1.000	-0.181	-0.570
Z2×X	0.136	-0.055	-0.054	0.169	0.173	-0.181	1.000	0.127
Z3×X	-0.223	-0.387	0.214	0.607	0.593	-0.570	0.127	1.000
Full collinearity VIF	1.611	1.892	1.128	3.257	2.154	1.525	1.085	3.236

Source: researcher data, 2026

Discriminant validity was assessed using the Fornell-Larcker criterion, which requires the square root of the average variance extracted (AVE) for each construct to exceed its correlations with other constructs. However, because all constructs are measured using a single indicator, their AVE values are 1.000, making this criterion inherently satisfied and providing limited evidence of discriminant validity (Table 3). Therefore, the correlations among constructs were also examined. Among the five substantive constructs, the largest absolute correlation was -0.671 between institutional ownership (Z1) and managerial ownership (Z3), followed by 0.611 between managerial ownership (Z3) and firm value (Y). Both correlations are below 0.85, suggesting that the constructs are empirically distinguishable. Correlations between interaction terms and their constituent variables, such as the correlation of 0.607 between Z3×X and Z3, are expected because the interaction terms are constructed from these variables. Furthermore, full collinearity VIF values range from 1.085 to 3.257, indicating that multicollinearity is generally not a serious concern. Nevertheless, the VIF values for managerial ownership (Z3 = 3.257) and its interaction term (Z3×X = 3.236) are relatively close to the specified threshold. Accordingly, the estimated moderating effect of managerial ownership should be interpreted with appropriate caution.

Table 4. Composite Reliability and Cronbach's Alpha of the Single-Indicator Constructs

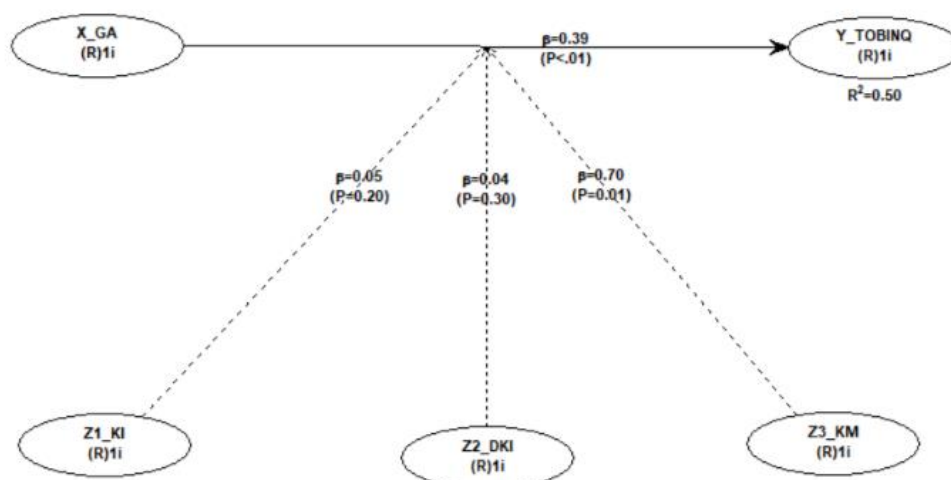
No	Latent variable	Composite reliability	Cronbach's alpha	Remarks
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1	Green Accounting (X)	1.000	1.000	Fixed (single item)
2	Institutional Ownership (Z1)	1.000	1.000	Fixed (single item)
3	Independent Board of Commissioners (Z2)	1.000	1.000	Fixed (single item)
4	Managerial Ownership (Z3)	1.000	1.000	Fixed (single item)
5	Firm Value (Y)	1.000	1.000	Fixed (single item)
6	Interaction Z1*X	1.000	1.000	Fixed (single item)
7	Interaction Z2*X	1.000	1.000	Fixed (single item)
8	Interaction Z3*X	1.000	1.000	Fixed (single item)

Source: researcher data, 2026

Table 4 shows composite reliability and Cronbach's alpha values of 1.000 for all constructs. Both statistics estimate the internal consistency of multiple items that measure the same construct; with a single indicator they have no empirical content, and WarpPLS reports 1.000 by default. These values should therefore not be read as evidence of perfect reliability. They reflect the assumption that each indicator measures its construct without measurement error, which cannot be tested with the present data. The reliability of the measures in this study rests on the use of objective data taken from published financial statements, annual reports, and sustainability reports, and on standard ratio formulas used in earlier studies. The use of single-indicator constructs is acknowledged as a limitation of this study.

Figure 1. Path diagram


Table 5. R-Square & Q-Square

Laten Endogen Variable	R-Square	Q-Square
Firm Value (Y)	0.501	0.467

Source: researcher data, 2026

The inner model test aims to assess the suitability and quality of the connection between exogenous and endogenous variable builds, facilitating the interpretation of hypothesis test results based on R-Square, Q-Square, and Goodness of Fit values. The structural model test results in Table 5 display R-Square value of 0.501 (50.1%), signifying that the Green Accounting variable (X1) exerts a 50.1% influence on Firm Value (Y) –representing a reasonably strong relationship– while the leftover 49.9% is accounted by other factors. The Q-Square test measures the model's predictive relevance; a Q-Square value greater than 0.05 signifies a good model, whereas a value below 0.05 suggests the research model lacks relevance. The Q-Square value in Table 6 is 0.467 –exceeding the 0.05 threshold– thereby confirming the relevance of the endogenous latent variable, Firm Value.

Table 6. Goodness of Fit

No	Model	Fit Criteria	Real Result	Remarks
1	Average Path Coefficient (AVC)	$P < 0.05$	0.293, $P = 0.003$	Good
2	Average Block VIF (AVIF)	Accepted If		

Source: researcher data, 2026

The Goodness-of-Fit test intends to demonstrate the validity of the hypothesis test results based on model fit values and quality indices. Table 6 shows an AVC value of 0.293 at a level of significance of $P=0.003$; this suggests

that the path coefficients represent significant correlations—specifically from exogenous variables to endogenous variables and from the variable moderates the endogenous variable. The AVIF value of 1.303 (which is below the threshold of 5) is acceptable showing the lack of multicollinearity or correlation between the variables.

Table 7. Hypothesis Result

No	Hypothesis	Variables Correlation		Path Coeff	P-Value	Remarks
1	H1	Green Accounting (X)	Firm Value (Y)	0.39	<0.01	Accepted
2	H2	Interaction (Z1X)	Firm Value (Y)	0.05	0.20	Rejected
3	H3	Interaction (Z2X)	Firm Value (Y)	0.04	0.30	Rejected
4	H4	Interaction (Z3X)	Firm Value (Y)	0.70	0.01	Accepted

Source: researcher data 2026

Table 7 displays the result hypothesis test that green accounting has significant positive impact on firm value and GCG proxied by managerial ownership, strengthens the positive influence of green accounting, while GCG proxied by institutional ownership and the independent commissioners board, fails to strengthen the positive impact of green accounting on firm value.

Table 8. Average of MEIGA Analysis

Model	Implementation level category	Average MEIGA results	Model
Green Accounting Implementation Evaluation Model (MEIGA)	< 0.333 = Low $0.333 - 0.666$ = Medium $> 0.666-1$ = High	Green Accounting Implementation Evaluation Model (MEIGA)	< 0.333 = Low

Based on Table 8, the mean MEIGA value is 0.163. According to the operational classification used in this study, this value belongs to the low category, as it is below 0.333. These findings suggest that the combined execution and sustainability of green accounting and corporate governance support mechanisms within the study sample remains at a relatively low level. The findings suggest that these companies have not yet integrated environmental aspects into their accounting systems and operational activities; specifically, the management, recording, and disclosure of information regarding environmental costs and activities remain limited, implying that green accounting has not been comprehensively implemented.

Discussion

Table 7 shows that the standardized path coefficient for green accounting is 0.389, indicating that a one-standard-deviation increase in green accounting is associated with a 0.389 standard-deviation increase in firm value, holding the interaction terms constant. The path coefficient for the interaction between green accounting and GCG (proxied by institutional ownership) is 0.045, this indicates that each one-standard-deviation increase in institutional ownership changes the effect of green accounting on firm value by 0.045 standardized units. The corresponding coefficient for GCG proxied by the independent board of commissioners is 0.040, and for GCG proxied by managerial ownership it is 0.700.

Hypothesis one (H1) posits that green accounting has a positive impact on firm value, with a path coefficient of 0.389 and a p-value of <0.001 . These results indicate that superior green accounting implementation—reflected in the management and disclosure of environmental costs—corresponds to a higher firm value, as indicated by Tobin's Q. Consequently, H1, stating that environmental accounting positively influences company value, is accepted. This discovery can be explained by the lens of signal theory. Information regarding environmental costs and activities serves as a signal to investors concerning a firm's capacity to identify and handle ecological hazards. For energy sector companies, which face relatively high exposure to environmental risks, such information is particularly relevant; investors consider not only a company's profit-generating capacity but also the sustainability of its operations and its ability to manage environmental risks. The study's results also support the stakeholder theory perspective. The adoption of green accounting reveals that a company considers the interests of a broader variety of interest parties, comprising the community and the environment. Transparency regarding environmental activities and costs can enhance stakeholder trust in the company, ultimately influencing market perceptions of firm value. These findings are consistent with those of Harahap and Yuyetta (2025), Yani and Wijaya (2024), and Wijaya et al. (2024), all of which indicate a positive connection between environmental accounting practices and company value. Therefore, the study provides empirical evidence that green accounting is not just about fulfilling environmental responsibilities but can also yield economic consequences by improving market perceptions of the company.

Hypothesis two (H2) posits that GCG—proxied by institutional ownership—strengthens the positive influence of green accounting on firm

value. Path analysis reveals that the moderating effect of GCG (proxied by institutional ownership) on the connection between green accounting and firm value is 0.045, with a p-value of 0.195, this indicates that the variable fails to enhance positive impact of green accounting on firm value, leading to the rejection of H2. These results suggest that the simple existence of institutional shareholders does not by default elicit a stronger market response to green accounting information and practices. While institutional ownership can act as a supervision tool, its effectiveness in the context of green accounting depends on the extent to which institutional shareholders actively consider environmental issues and incorporate them into their oversight and investment decision-making processes. The findings indicate that a high percentage of institutional ownership does not necessarily equate to high-quality oversight of a company's environmental policies. Institutional investors may have diverse investment objectives and do not all prioritize environmental information equally. Consequently, institutional ownership within the study sample has not been shown to exert a significant additional influence on the connection between green accounting and company value. These findings imply that the GCG effectiveness mechanism is determined not only by the ownership structure itself but also by the quality of engagement and monitoring exercised by institutional shareholders.

Hypothesis three (H3) posits that GCG proxied by the presence of an independent commissioner board strengthens the positive influence of green accounting on firm value. Path analysis reveals a moderation factor of 0.040 with a p-value of 0.302, this suggests that the GCG variable proxied by the independent commissioner board does not enhance the positive impact of green accounting on firm value, resulting in the rejection of H3. These results indicate that the presence of independent commissioners does not have to directly improve the efficiency of green accounting in creating firm value. While independent commissioners perform a management oversight function, the scope of this oversight may be directed more toward compliance, internal controls, and general corporate governance rather than the management and disclosure of environmental costs. The lack of a significant moderating effect may also indicate that the simple existence of independent commissioners is quantitatively inadequate to ensure high-quality oversight regarding environmental issues. The effectiveness of independent commissioners can be influenced by factors such as competence, experience, substantive independence, meeting frequency, and the level of attention paid to sustainability issues.

Consequently, the percentage of independent commissioners utilized in this study failed to demonstrate a significant moderating effect.

Hypothesis four (H4) posits that GCG proxied by managerial ownership enhance the positive impact of green accounting on company value. Path diagram analysis reveals a moderation coefficient of 0.700, p -value = 0.012 for the connection between GCG proxied by managerial ownership) and firm value, this indicates that the GCG variable effectively strengthens the positive impact of green accounting on firm value, thereby supporting H4. Higher levels of managerial ownership tend to yield greater benefits from the execution of green accounting in terms of enhancing firm value. The result is broadly consistent with the relevance of managerial ownership to market value discussed by Adinegara and Herliansyah (2023). However, the present study offers more specific evidence by testing managerial ownership as a moderator of the green accounting–firm value relationship rather than examining governance and market value only as a general association. The significant interaction also distinguishes managerial ownership from institutional ownership and independent commissioners in the current empirical model.

4. Conclusion

This study examines the effect of green accounting on firm value, the moderating roles of institutional ownership, independent commissioners, and managerial ownership, and the development of the Green Accounting Implementation Evaluation Model (MEIGA) among energy-sector companies listed on the Indonesia Stock Exchange during 2023–2025. Based on 84 firm-year observations from 28 companies, the results indicate that green accounting has a positive and significant association with firm value ($\beta = 0.39$, $p < 0.01$). Managerial ownership significantly strengthens this relationship ($\beta = 0.70$, $p = 0.01$), whereas institutional ownership ($\beta = 0.05$, $p = 0.20$) and independent commissioners ($\beta = 0.04$, $p = 0.30$) do not demonstrate significant moderating effects.

Theoretically, these findings contribute to the integration of signaling, stakeholder, and agency theories by highlighting the relevance of environmental cost information to firm valuation and the distinct roles of corporate governance mechanisms. However, the moderation results indicate that governance mechanisms should not be assumed to have equivalent effects. The relatively large managerial ownership interaction coefficient should be interpreted

cautiously because the corresponding full collinearity VIF values are close to the adopted threshold.

This study also introduces MEIGA as a preliminary evaluation framework, rather than a variable in hypothesis testing. The average score of 0.163 falls within the low category under the study's classification. Nevertheless, this score reflects only the selected indicators and estimated weights; it should not be interpreted as definitive evidence of inadequate green accounting implementation across all dimensions.

The findings have several practical implications. Energy companies should improve the identification, measurement, recording, and disclosure of environmental costs and integrate this information into management accounting and decision-making. Investors may consider environmental cost information alongside financial performance, environmental risks, and governance quality when evaluating investment opportunities. Regulators may promote more consistent environmental cost reporting and greater comparability of environmental disclosures. The nonsignificant moderation results for institutional ownership and independent commissioners also highlight the importance of assessing governance effectiveness beyond ownership proportions and board composition. These implications are recommendations derived from the findings, not directly tested policy effects.

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