Indonesia Auditing Research Journal, 15 (2) (2026), pp. 194-203

Published by: Institute of Accounting Research and Novation (IARN)

Indonesia Auditing Research Journal

Journal homepage: https://journals.iarn.or.id/index.php/ARJ/index

The effect of ESG disclosure and PROPER rating on corporate financial performance with GCG as a moderating variable in Indonesia's energy sector

Vennesa Aisah Mulyana[1], Sugeng[2]

[1,2]Accounting Department, Universitas Teknologi Yogyakarta, Indonesia

Article Info

Article history:

Received May 25, 2026
Revised Jun 3, 2026
Accepted Jun 12, 2026

Keywords:

ESG Disclosure;
Financial Performance;
Good Corporate Governance;
PROPER Rating.

ABSTRACT

The paradigm of corporate performance assessment has undergone a fundamental shift, moving beyond narrow financial metrics toward comprehensive sustainability indicators. This study investigates the influence of Environmental, Social, and Governance (ESG) disclosure and PROPER (Program Penilaian Peringkat Kinerja Perusahaan dalam Pengelolaan Lingkungan Hidup) environmental rating on corporate financial performance, with Good Corporate Governance (GCG) serving as a moderating variable. Employing a quantitative-causal research design with balanced panel data drawn from 25 energy sector companies listed on the Indonesia Stock Exchange (IDX) over the period 2020–2025 (150 firm-year observations), this study applies Fixed Effect Model (FEM) panel regression and Moderated Regression Analysis (MRA) with mean-centered interaction terms. Empirical results demonstrate that ESG disclosure exerts a statistically significant and positive effect on Return on Equity (ROE) ($\beta = 0.3387$; $p = 0.0028$), consistent with the predictions of stakeholder theory and signaling theory. PROPER environmental rating, however, yields no statistically significant direct effect on ROE ($\beta = 0.0071$; $p = 0.8657$), attributable to constrained rating dispersion within the sample and the long-horizon reputational nature of government-mandated environmental signals. Critically, GCG significantly amplifies the ESG–ROE relationship through a complementary moderation mechanism ($\beta = 6.4801$; $p = 0.0002$), indicating that robust governance structures substantially enhance the value relevance of sustainability disclosures. The model demonstrates strong explanatory power (Adjusted $R^2 = 0.6825$; Durbin-Watson = 2.0028), advancing theoretical understanding of sustainability governance performance dynamics within the Indonesian energy sector.

Corresponding Author:

Vennesa Aisah Mulyana,
Faculty of Business and Humaniora,
Universitas Teknologi Yogyakarta,
Jl. Siliwangi (Ring Road Utara), Jombor, Sleman, Yogyakarta, 55285, Indonesia
Email: vennesamulyana@uty.ac.id

1. INTRODUCTION

The paradigm governing corporate performance assessment has undergone a fundamental and irreversible transformation. Organizational success is no longer adequately represented by net profit alone; it must equally encompass the capacity to generate sustained value for society and the environment simultaneously (Elkington, 1998). This shift has been reinforced by the international community's commitments under the Paris Agreement of 2015 and the United Nations Sustainable

Development Goals (SDGs), which collectively position the energy sector as the epicenter of the global transition toward a low-carbon economy (Sachs et al., 2021). Accordingly, the principles of Environmental, Social, and Governance (ESG) have evolved from philanthropic initiatives into strategic determinants that directly influence corporate access to global capital markets (Eccles et al., 2014; Friede et al., 2015).

Energy sector companies in Indonesia currently face a dual imperative: ensuring national energy supply security while meeting stakeholder expectations for responsible and sustainable business practices. Compared with other industrial sectors, the energy sector has higher environmental exposure because it is closely associated with carbon emissions, fossil-fuel dependence, environmental licensing, and public scrutiny. Therefore, ESG disclosure and PROPER ratings are particularly relevant in this sector as material signals for investors, regulators, and wider stakeholders. The scale of global sustainable investment, now exceeding USD 35 trillion (Dumas & Louche, 2021), reflects the capital market's heightened sensitivity to ESG dimensions. The Financial Services Authority (OJK), through Regulation POJK 51/POJK.03/2017, has mandated that publicly listed companies prepare sustainability reports (Gunawan et al., 2020), while the Ministry of Environment and Forestry (KLHK) has implemented PROPER as a reputation-based regulatory incentive instrument for environmental performance monitoring (Sarumpaet et al., 2017).

Despite the growing body of empirical evidence, the relationship between ESG disclosure and corporate financial performance remains theoretically contested and empirically inconsistent. A key internal factor that may account for this inconsistency is Good Corporate Governance (GCG). Governance mechanisms, particularly independent board commissioners, function as internal oversight instruments that enhance the credibility of ESG initiatives and mitigate the risks associated with greenwashing (Handayani & Wijayanti, 2024; Jensen, 1993; Kusumawati & Hartono, 2024).

Several significant research gaps remain unaddressed in the existing literature. First, the majority of prior studies examine direct ESG-performance linkages without integrating governance mechanisms as moderating variables (Pratama & Lestari, 2024). Second, the simultaneous incorporation of PROPER ratings and GRI-based ESG disclosure within a unified analytical framework remains rare. Third, the sector-specific dynamics of Indonesia's energy industry have yet to be adequately explored.

To address these gaps, this study aims to analyze: (1) the effect of ESG disclosure on return on equity (ROE); (2) the effect of PROPER rating on ROE; and (3) the moderating role of GCG in the ESG-ROE and PROPER-ROE relationships. The analysis draws on a dataset comprising 25 energy sector companies listed on the Indonesia Stock Exchange (IDX) over the period 2020-2025, yielding 150 firm-year observations.

Theoretical Framework and Hypothesis Development: a) *Stakeholder Theory*, the stakeholder theory framework, as elaborated by Parmar et al. (2010), posits that long-term organizational sustainability is determined by a firm's capacity to effectively manage relationships with all constituent groups, including shareholders, employees, customers, suppliers, local communities, and regulatory authorities. This perspective fundamentally transcends the traditional doctrine that maximization of shareholder wealth constitutes the sole objective function of the corporation (Donaldson & Preston, 1995). In the context of the energy sector, comprehensive ESG disclosure is conceptualized as a mechanism through which firms construct social capital, thereby enhancing organizational legitimacy and reputational standing, which ultimately contributes to sustainable economic value creation(Friede et al., 2015); b) *Legitimacy Theory* conceptualizes the relationship between organizations and the social order within which they operate as an implicit social contract (Suchman, 1995). When a gap emerges between corporate practices and the normative expectations of society, firms face the risk of eroding public support, which may manifest as consumer boycotts, regulatory tightening, or licensing barriers. Energy companies, classified as high-profile industries, tend to leverage ESG disclosures and PROPER rating achievements as proactive legitimation strategies to pre-empt reputational threats and maintain their social license to operate (Adinugraha et al., 2022); c) Signaling theory, originally articulated by Spence (1973)and subsequently adapted to

the corporate context by Connelly et al. (2011), addresses the problem of information asymmetry between internal and external parties. Firms possessing superior quality will communicate their advantages to capital markets through credible signals in order to differentiate themselves from lower-quality competitors. Within this framework, high-quality ESG disclosures and PROPER ratings serve as credible signals of long-term risk management quality to the investment community, thereby reducing perceived uncertainty and lowering the equity cost of capital (Kusumawati & Hartono, 2024); d) Agency theory, as formulated by Jensen & Meckling (1976), identifies the potential for conflicts of interest between shareholders as principals and managers as agents. Agency costs arise when managers allocate corporate resources toward objectives that serve their own interests at the expense of value creation for principals. GCG, operating through oversight mechanisms such as independent board commissioners and audit committees, plays a critical role in reducing agency costs by ensuring that investments in ESG initiatives are executed efficiently and are strategically aligned with the firm's value creation objectives (Handayani & Wijayanti, 2024).

ESG Disclosure and the GRI Framework, ESG disclosure in Indonesia has transitioned from a voluntary practice to a standardized regulatory obligation. The Global Reporting Initiative (GRI) Standards represent the dominant international framework for sustainability reporting, encompassing general disclosures (GRI 2), economic performance (GRI 200), environmental aspects (GRI 300), and social dimensions (GRI 400) (Helfaya et al., 2019; Kurniawan & Wahyuni, 2018). For the energy sector specifically, GRI has developed sector-specific standards, GRI 11 for oil and gas, GRI 12 for coal, and GRI 14 for mining, applicable from 2023 to 2026 (Helfaya et al., 2019). In the present study, the ESG disclosure index is constructed based on 58 GRI-relevant items, comprising 20 Environmental indicators (GRI 300 series), 25 Social indicators (GRI 400 series), and 13 Governance/Economic indicators (GRI 2 and GRI 200 series).

PROPER as a Proxy for Environmental Performance, PROPER constitutes a distinctive regulatory instrument that combines command-and-control approaches with reputation-based informational incentives (Sarumpaet et al., 2017). Its assessment system employs a five-color categorization based on levels of regulatory compliance and environmental performance: Gold (sustained excellence with eco-innovation), Green (beyond regulatory compliance), Blue (meeting minimum standards), Red (partial non-compliance), and Black (serious violations) (Darsono et al., 2020). For the purposes of quantitative analysis, the color-coded ratings are converted to an ordinal scale of 1–5, where Black = 1 and Gold = 5 (Lestari & Pratiwi, 2023).

Financial Performance: Return on Equity (ROE), Return on Equity (ROE) quantifies the effectiveness with which a firm utilizes shareholders' equity, representing a primary performance indicator for investors assessing the return on their invested capital (Kusumawati & Hartono, 2024). ROE is calculated as follows: ROE = (Net Income After Tax / Total Equity) × 100% ..... (1)

Good Corporate Governance as a Moderating Variable, within the agency theory framework, GCG functions as an internal mechanism that mitigates conflicts of interest and ensures managerial accountability (Jensen, 1993). The GCG proxies employed in this study are: (a) the proportion of independent commissioners to the total board of commissioners; and (b) audit committee effectiveness, measured through committee size and meeting frequency (Handayani & Wijayanti, 2024; Kusumawati & Hartono, 2024). The moderating role of GCG may be complementary, whereby strong governance amplifies the positive impact of ESG on financial performance, or substitutive, a phenomenon referred to as signal saturation. In the latter case, when a firm already possesses high credibility through an established governance structure, the incremental benefit of additional ESG disclosure becomes increasingly marginal (Kusumawati & Hartono, 2024).

Hypothesis Development: H1: ESG disclosure exerts a statistically significant effect on the financial performance (ROE) of energy sector companies listed on the IDX. H2: PROPER rating exerts a statistically significant effect on the financial performance (ROE) of energy sector companies listed on the IDX. H3: GCG moderates the effect of ESG disclosure on the financial performance of energy sector companies listed on the IDX. H4: GCG moderates the effect of PROPER rating on the financial performance of energy sector companies listed on the IDX.

Research Model, this research model illustrates the direct effects of ESG disclosure and PROPER rating on financial performance, measured by ROE, and the moderating role of GCG in strengthening or weakening these relationships. The framework is tested using panel regression and moderated regression analysis based on secondary data from IDX-listed energy sector companies.

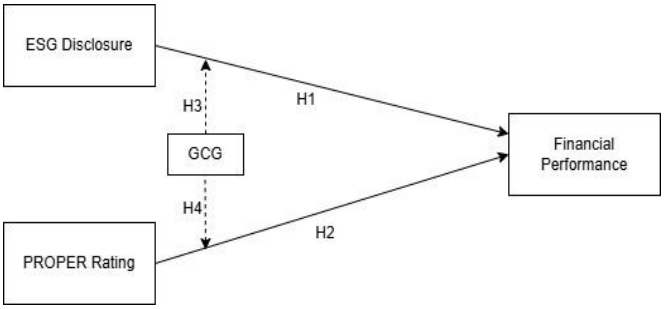

Figure 1. Research conceptual framework

2. RESEARCH METHOD

Research Design and Data

This study adopts a quantitative-causal research approach using panel data that integrates both cross-sectional and time-series dimensions. Secondary data were sourced from annual reports, sustainability reports, and official KLHK announcements regarding PROPER ratings of IDX-listed energy sector companies over the period 2020–2025 (Pratama & Lestari, 2024). This period was selected to capture the COVID-19 disruption, the post-pandemic recovery phase, and the strengthening of sustainability reporting practices among Indonesian listed firms. The six-year window also enables balanced panel analysis of 25 companies, yielding 150 firm-year observations, and provides sufficient variation to examine the relationship between ESG disclosure, PROPER rating, GCG, and ROE. Panel data regression was selected due to its capacity to control for unobserved firm-specific heterogeneity and to improve estimation efficiency compared with purely cross-sectional or time-series approaches.

Population and Sample

The population encompasses all companies classified under the energy sector (IDXENERGY) according to the IDX Industrial Classification (Purbawangsa et al., 2020), comprising approximately 44 listed entities. A purposive sampling procedure yielded a final sample of 25 companies and 150 firm-year observations. Inclusion criteria were as follows: (1) continuously listed on the IDX throughout 2020–2025; (2) having published complete annual and sustainability reports for all years in the study period; (3) possessing ESG disclosure data assessable against 58 GRI Standards indicators; (4) having received an official PROPER rating from KLHK; and (5) having complete financial data for all relevant variables.

Variable Operationalization

The dependent variable is ROE, calculated as net income divided by total equity. The independent variables are the ESG disclosure index (based on 58 GRI items) and PROPER rating (ordinal scale 1–5). The moderating variable is GCG, operationalized as the proportion of independent board commissioners. Control variables include firm size (natural logarithm of total assets) and financial leverage (Debt-to-Equity Ratio). The complete operationalization is presented in Table 1.

Table 1. Variable operationalization

Variable	Type	Proxy	Measurement
ROE	Dependent	Equity profitability	(Net income after tax / Total equity)× 100%
ESG Disc.	Independent	GRI Standards index (58 items)	Σ items disclosed / Total items (20 env. + 25 social + 13 gov.)
PROPER	Independent	KLHK environmental rating	Ordinal: Black=1, Red=2, Blue=3, Green=4, Gold=5

Variable	Type	Proxy	Measurement
GCG	Moderating	Independent commissioners	No. of independent commissioners / Total board members
SIZE	Control	Firm size	Natural logarithm of total assets: Ln(Total Assets)
LEV	Control	Financial leverage	Total debt / Total equity (Debt-to-Equity Ratio)

Source: Adapted from(Friede et al., 2015); Kusumawati & Hartono (2024); Pratama & Lestari (2024)

Empirical Model Specification

The ESG disclosure index is computed through content analysis as follows:

$$ESG\_Disc(it) = (\Sigma\, d(ijt)) / n \quad \text{..... (2)}$$

where d(ijt) = 1 if GRI item j is disclosed by firm i in year t, and 0 otherwise.

Hypothesis testing employs panel data regression with three estimation approaches: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). Model selection follows a sequential testing procedure: the Chow Test for CEM vs. FEM, the Hausman Test for FEM vs. REM, and the Lagrange Multiplier Test for individual effect significance. Based on the results of all three tests, the Fixed Effect Model (FEM) was selected as the optimal estimator.

The main model (without interaction term) is specified as:

$$Y(it) = \alpha + \beta_1 ESG(it) + \beta_2 PROPER(it) + \beta_3 GCG(it) + \beta_4 SIZE(it) + \beta_5 LEV(it) + \varepsilon(it) \quad \text{..... (3)}$$

The Moderated Regression Analysis (MRA) model with mean-centered variables is specified as:

$$Y(it) = \alpha + \beta_1 ESG\_C(it) + \beta_2 PROPER(it) + \beta_3 GCG\_C(it) + \beta_4 (ESG\times GCG)(it) + \beta_5 SIZE(it) + \beta_6 LEV(it) + \varepsilon(it) \quad \text{..... (4)}$$

where Y(it) = ROE; α = intercept; β = regression coefficients; ESG_C and GCG_C = mean-centered variables; ESG×GCG = interaction term. Mean-centering of ESG and GCG prior to constructing the interaction term serves to mitigate multicollinearity. The significance threshold is set at α = 0.05.

3. RESULTS AND DISCUSSIONS

Descriptive Statistics

Table 2 presents the descriptive statistics for all 150 firm-year observations. The mean ROE of 0.2171 indicates moderate equity profitability, while the considerable dispersion (SD = 0.2376) reflects substantial performance heterogeneity across sample firms. The minimum ROE of –0.4623 indicates that certain firms experienced net losses, particularly during the COVID-19 pandemic period (2020-2021). The mean ESG disclosure score of 0.4980 suggests moderate compliance with GRI Standards, with substantial room for improvement, particularly in areas relating to energy transition strategies and carbon emission reduction targets. The predominance of PROPER Blue ratings (mean = 3.3333) indicates that the majority of sampled firms achieve only minimum regulatory compliance (Sarumpaet et al., 2017). The mean GCG ratio of 0.3623 exceeds OJK's minimum requirement of 30% independent commissioners. Leverage exhibits very high dispersion (SD = 8.1948), attributable to several firms with extreme Debt-to-Equity Ratios reaching 37.86.

Table 2. Descriptive statistics of research variables (n = 150)

Statistic	ROE	ESG Disc.	PROPER	GCG	Firm Size	Leverage
Mean	0.2171	0.4980	3.3333	0.3623	30.2263	6.0411
Median	0.1971	0.4828	3.0000	0.3750	30.3914	2.1650
Maximum	1.2192	0.8621	5.0000	0.5000	32.3175	37.8609
Minimum	–0.4623	0.2414	2.0000	0.2857	28.1439	0.1456
Std. Dev.	0.2376	0.1208	0.6416	0.0530	1.0576	8.1948
Skewness	1.5620	0.3448	1.4052	0.2275	–0.1508	2.0368
Kurtosis	7.8843	2.9660	4.2179	2.4458	2.3530	6.7776
Jarque-Bera	210.09	2.9798	58.635	3.2128	3.1847	192.91
Prob. (JB)	0.0000	0.2254	0.0000	0.2006	0.2034	0.0000
Observations	150	150	150	150	150	150

Source: EViews output (2026). JB = Jarque-Bera; ROE and ESG expressed in decimal form; GCG = proportion of independent commissioners.

Correlation Matrix

Table 3 presents the bivariate correlation matrix among all research variables. ROE exhibits the highest positive correlations with ESG (r = 0.469) and GCG (r = 0.419), suggesting that firms with more comprehensive sustainability disclosures and stronger governance structures tend to demonstrate higher equity profitability. The near-zero correlation between ROE and PROPER (r = −0.003) indicates a weak simple linear relationship between environmental ratings and financial profitability. SIZE and LEV display a moderately high inter-correlation (r = 0.522); however, variance inflation factors (VIF) remained within acceptable bounds following mean-centering.

Table 3. Variable correlation matrix

Variable	ROE	ESG	PROPER	GCG	SIZE	LEV
ROE	1.0000	0.4690	−0.0027	0.4191	−0.0521	−0.1949
ESG	0.4690	1.0000	−0.1543	0.3014	0.0145	−0.0265
PROPER	−0.0027	−0.1543	1.0000	−0.0654	0.3925	−0.0820
GCG	0.4191	0.3014	−0.0654	1.0000	0.0866	−0.0499
SIZE	−0.0521	0.0145	0.3925	0.0866	1.0000	0.5222
LEV	−0.1949	−0.0265	−0.0820	−0.0499	0.5222	1.0000

Source: EViews output (2026). ROE and ESG expressed in decimal form.

Panel Model Selection

Three sequential tests were conducted to determine the optimal panel estimation model. The Chow Test produced a statistically significant cross-section F-statistic ($p < 0.05$), establishing FEM's superiority over CEM. The Hausman Test generated a statistically significant chi-squared statistic ($p < 0.05$), confirming that FEM is more consistent than REM due to the correlation of individual effects with the independent variables. The Lagrange Multiplier Test confirmed the statistical significance of individual effects, further reinforcing the selection of FEM as the optimal estimator. The Durbin-Watson statistic of 2.0028 in the MRA model confirms the absence of serial autocorrelation, and cross-section fixed effects demonstrated effectiveness in capturing unobserved firm-specific characteristics.

Panel Regression Results and Hypothesis Testing

Table 4 summarizes the estimation results for the Main Model (FEM without interaction term) and the Moderation Model MRA (FEM with mean-centered ESG×GCG interaction term). Both models exhibit strong predictive capacity ($R^2 = 0.7142$ and 0.7465; F-statistic significant at $p < 0.001$), indicating robust overall model validity. The increase in Adjusted R^2 from 0.6452 to 0.6825 confirms the significant contribution of the ESG×GCG interaction term in enhancing the model's explanatory power. It should be noted that the PROPER×GCG interaction term was excluded from the MRA model due to severe multicollinearity (r = 0.985 between GCG_C and the PROPER×GCG term). Simultaneous inclusion of both terms would have resulted in substantial standard error inflation, yielding misleading inferential conclusions and violating the principle of model parsimony.

Table 4. Summary of panel regression estimation results

Variable	Main Model (FEM) β	Moderation Model MRA β
C (Constant)	−1.3566 [0.1984]	−0.9083 [0.3608]
ESG / ESG_C	0.3863*** [0.0012]	0.3387*** [0.0028]
PROPER	0.0218 [0.6232]	0.0071 [0.8657]
GCG / GCG_C	0.9745*** [0.0002]	0.8796*** [0.0004]
ESG × GCG (H3)	–	6.4801*** [0.0002]
SIZE	0.0328 [0.3556]	0.0371 [0.2702]
LEV	−0.0061 [0.1949]	−0.0054 [0.2251]
R-squared	0.7142	0.7465
Adjusted R^2	0.6452	0.6825
F-statistic	10.3418 [0.0000]***	11.6787 [0.0000]***
Durbin-Watson	1.9111	2.0028
Estimation Method	Fixed Effect (FEM)	Fixed Effect (FEM)

*Note: *** p < 0.01; ** p < 0.05; * p < 0.10. Figures in square brackets denote probability values. MRA = mean-centered interaction Fixed Effect Model.*

Effect of ESG Disclosure on Financial Performance (H1)

The coefficient of ESG_C (β = 0.3387; p = 0.0028) confirms that H1 is supported at the 1% significance level. This finding is consistent with the predictions of stakeholder theory and signaling theory: comprehensive sustainability disclosure strengthens shareholder confidence and attracts ESG-oriented institutional capital, which in turn promotes more efficient access to equity financing and lowers the cost of equity capital (Friede et al., 2015). In substantive terms, an increase in the ESG disclosure index from its minimum value (0.2414) to its maximum (0.8621), a range of 0.621, is associated with an increase in ROE of approximately 0.210 points, which is economically significant given that the sample mean ROE is only 0.217.

These results indicate that Indonesian energy firms adopting GRI Standards reporting substantively—beyond mere check-the-box compliance—successfully communicate long-term risk management commitments to ESG-oriented institutional investors, with improving disclosure quality from ~50% to >75% having the potential to generate a material ROE premium. These findings are aligned with Pratama & Lestari (2024) and consistent with the meta-analytic evidence of Friede et al. (2015) and Eccles et al. (2014), who collectively document a predominantly positive ESG–financial performance relationship across global markets.

Effect of PROPER Rating on Financial Performance (H2)

The coefficient of PROPER (β = 0.0071; p = 0.8657) indicates that H2 is not supported. PROPER rating does not demonstrate a statistically significant effect on ROE in either the Main Model or the MRA Model. This null result may be explained through two complementary mechanisms. First, there is a substantive limitation in PROPER rating variability within the sample: approximately 68% of observations are concentrated in the Blue category (minimum compliance), resulting in insufficient cross-firm variation to detect statistically significant effects. This is an inherent methodological constraint arising from the tendency of Indonesia's PROPER system to produce clustering around middle-tier ratings. Second, the PROPER-ROE relationship may be inherently non-linear, with only Gold-rated firms generating a significant financial performance premium, or may be mediated by variables such as brand reputation, access to green finance (green bonds), and market valuation premiums that are not captured by accounting-based ROE metrics.

These findings are consistent with Darsono et al. (2020), who argue that PROPER ratings function primarily as long-horizon reputational signals rather than direct drivers of equity profitability. From a legitimacy theory perspective, a threshold of Green or Gold ratings may be required before PROPER generates the differentiation needed to produce a measurable financial performance premium; future studies are therefore encouraged to investigate the non-linear PROPER–ROE relationship using quadratic or threshold regression specifications.

The Moderating Role of GCG on the ESG–ROE Relationship (H3)

The interaction coefficient ESG_C×GCG_C (β = 6.4801; p = 0.0002) confirms that H3 is supported at the 1% significance level. GCG is demonstrated to significantly moderate the effect of ESG disclosure on ROE through a complementary mechanism: strong governance amplifies the positive impact of ESG on financial performance. This complementary moderation operates through a credibility channel, transparent and accountable governance structures provide investors with assurance that a firm's ESG initiatives are substantively grounded rather than cosmetic window dressing (Wulandari & Pramono, 2024). Effective independent commissioners ensure the integration of sustainability considerations into strategic decision-making while simultaneously verifying the reliability of non-financial data disclosed to the public (Handayani & Wijayanti, 2024; Juliana & Hidayat, 2024).

In substantive terms, the interaction coefficient of 6.4801 implies that a one-standard-deviation increase in both ESG_C and GCG_C jointly generates a ROE increment far exceeding the

individual direct effects of either variable (ESG: 0.3387; GCG: 0.8796), revealing a powerful synergy: firms that simultaneously achieve high ESG disclosure quality and strong governance structures enjoy ROE premiums substantially exceeding the cumulative benefits of either dimension in isolation, confirming that GCG is a critical prerequisite—not merely a complementary factor—for the value relevance of ESG signals.

GCG Moderation on the PROPER–ROE Relationship (H4)

The PROPER×GCG interaction term was excluded from the MRA model due to severe multicollinearity (r = 0.985 between GCG_C and the interaction term), which would violate foundational OLS regression assumptions and produce inflated standard errors that distort inferential interpretation. The exclusion of this interaction term is methodologically justified by the principles of model parsimony and valid panel econometrics. Consequently, H4 cannot be empirically tested within the MRA framework employed here; analytically, this limits the interpretation of PROPER to its direct effect on ROE and prevents a separate conclusion on whether governance strengthens or weakens the PROPER–ROE relationship. Therefore, the unsupported H4 should be interpreted as a methodological limitation rather than definitive evidence that GCG has no moderating role in the PROPER–ROE pathway. This limitation likely stems from the inherent overlap between governance mechanisms and environmental regulation as captured by PROPER at the aggregate firm level. Future research is encouraged to employ alternative moderating proxies, such as audit committee quality or institutional ownership concentration, and to explore PROPER-GCG interactions using alternative estimation methods such as quantile regression or panel threshold models.

Synthesis: The Sustainability Value Transmission Mechanism

The empirical findings collectively suggest a three-stage value transmission mechanism: (1) GRI-aligned ESG reporting builds stakeholder trust and reduces reputational risk (Parmar et al., 2010); (2) ESG signals credentialed by strong GCG attract sustainability-oriented capital and lower equity financing costs (Eccles et al., 2014; Friede et al., 2015); and (3) clean technology investments yield long-term operational savings that improve net margins (Adinugraha et al., 2022). The statistical insignificance of PROPER confirms that government-mandated environmental ratings, functioning primarily as binary compliance signals, are insufficient alone to drive equity profitability absent credible governance and substantive ESG disclosure.

4. CONCLUSION

This study provides three main findings. First, ESG disclosure has a positive and significant effect on ROE (β = 0.3387; p = 0.0028), supporting stakeholder and signaling theory. Second, PROPER rating has no significant direct effect on ROE (β = 0.0071; p = 0.8657), mainly due to limited rating dispersion and the long-term reputational nature of environmental performance signals. Third, GCG significantly strengthens the ESG–ROE relationship (β = 6.4801; p = 0.0002), confirming that strong governance enhances the value relevance of ESG disclosure.

Theoretically, this study integrates stakeholder, legitimacy, signaling, and agency perspectives to explain the interaction between ESG disclosure, governance, and financial performance. Practically, Indonesian energy firms should improve ESG disclosure quality, strengthen the effectiveness of independent commissioners beyond the minimum regulatory threshold, and position PROPER Green ratings as part of medium-term sustainability strategy. Regulators should further align domestic sustainability reporting with recent ISSB and GRI sector-specific standards.

Several research limitations merit acknowledgment for the purpose of informing future inquiry: (1) the use of accounting-based ROE, which may not fully reflect market-based value creation; future studies should complement ROE with Tobin's Q, market-to-book ratio, and stock return; additional indicators such as cumulative abnormal return (CAR), price-to-earnings ratio, and market capitalization-based firm value may also capture investor valuation responses to ESG disclosure; (2) the GCG proxy being restricted to the proportion of independent commissioners; and

(3) the potential presence of endogeneity in the ESG-performance relationship, which has not been addressed through an instrumental variable (IV) approach.

ACKNOWLEDGEMENTS

The authors wish to express sincere gratitude to the Indonesia Stock Exchange (IDX), the Ministry of Environment and Forestry (KLHK), and all energy sector issuers whose publicly accessible data underpinned this research. The authors also extend appreciation to the anonymous reviewers for their constructive feedback, which substantially enhanced the quality of this manuscript.

REFERENCES

Adinugraha, H. H., Sari, P., & Wibowo, A. (2022). Energy sector transition and ESG strategies: Empirical evidence from Indonesian listed firms. *Energy Policy*, *163*, 112836. https://doi.org/10.1016/j.enpol.2022.112836

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, *37*(1), 39–67. https://doi.org/10.1177/0149206310388419

Darsono, S., Wardani, R., & Pratama, R. (2020). Color-coded environmental rating (PROPER) and corporate performance in developing nations. *Environmental Economics and Policy Studies*, *22*(3), 455–472. https://doi.org/10.1007/s10018-020-00264-3

Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *The Academy of Management Review*, *20*(1), 65–91. https://doi.org/10.2307/258887

Dumas, C., & Louche, C. (2021). Global sustainable investment trends: A review of ESG integration. *Journal of Sustainable Finance and Investment*, *11*(1), 80–105. https://doi.org/10.1080/20430795.2021.1875257

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835–2857. https://doi.org/10.1287/mnsc.2014.1984

Elkington, J. (1998). Accounting for the triple bottom line. *Measuring Business Excellence*, *2*(3), 18–22. https://doi.org/10.1108/eb025539

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Gunawan, J., Permatasari, P., & Tilt, C. (2020). Sustainable development goal disclosures: Do they support sustainable development? *Journal of Cleaner Production*, *246*, 118989. https://doi.org/10.1016/j.jclepro.2019.118989

Handayani, R., & Wijayanti, A. (2024). Pengaruh profesionalisme komisaris independen, kinerja ESG dan indeks keberlanjutan terhadap earnings manipulation dengan kualitas audit sebagai variabel moderasi. *Journal of Accounting and Finance Management*, *5*(1), 45–62.

Helfaya, A., Whittington, R., & Al-Malkawi, H. N. (2019). Sector-specific GRI reporting guidelines: Enhancing corporate transparency. *Business Strategy and the Environment*, *28*(4), 459–475. https://doi.org/10.1002/bse.2264

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, *48*(3), 831–880. https://doi.org/10.1111/j.1540-6261.1993.tb04022.x

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Juliana, R., & Hidayat, M. (2024). Pengaruh dewan komisaris independen, komite audit, dan ukuran perusahaan terhadap pengungkapan sustainability report. *Jurnal Global Akuntansi*, *3*(2), 88–104.

Kurniawan, T., & Wahyuni, S. (2018). Global reporting initiative (GRI) standards and sustainability reporting: The case of Indonesia. *Journal of Environmental Accounting and Management*, *6*(4), 315–325. https://doi.org/10.5890/JEAM.2018.12.006

Kusumawati, D., & Hartono, B. (2024). Kinerja ESG, independensi komite audit, dan biaya modal: Bukti dari Indonesia. *Owner: Riset Dan Jurnal Akuntansi*, *8*(3), 1711–1725. https://doi.org/10.33395/owner.v8i3.1869

Lestari, A., & Pratiwi, H. (2023). Green accounting, kinerja lingkungan, dan profitabilitas: Analisis perusahaan manufaktur di BEI. *Jurnal Akuntansi Bisnis*, *21*(1), 56–72.

Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & de Colle, S. (2010). Stakeholder theory: The state of the art. *The Academy of Management Annals*, *4*(1), 403–445. https://doi.org/10.5465/19416520.2010.495581

Pratama, Y., & Lestari, S. (2024). The influence of ESG disclosure on company performance in the energy sector. *Formosa Journal of Multidisciplinary Research*, *3*(5), 572–590. https://doi.org/10.55927/fjmr.v3i5.8671

Purbawangsa, I. B. A., Sutrisno, B., & Rahyuda, H. (2020). Corporate governance, corporate profitability toward sustainability reporting of IDX energy sector. *Social Responsibility Journal*, *16*(6), 833–846. https://doi.org/10.1108/SRJ-06-2018-0151

Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockstrom, J. (2021). Six transformations to achieve the sustainable development goals. *Nature Sustainability*, *2*(9), 805–814. https://doi.org/10.1038/s41893-019-0352-9

Sarumpaet, S., Nelwan, M. L., & Dewi, D. N. (2017). The value relevance of environmental performance: Evidence from Indonesia's PROPER. *Business Strategy and the Environment*, *26*(8), 1128–1143. https://doi.org/10.1002/bse.1979

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, *87*(3), 355–374. https://doi.org/10.2307/1882010

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *The Academy of Management Review*, *20*(3), 571–610. https://doi.org/10.2307/258788

Wulandari, N., & Pramono, S. (2024). The effect of good corporate governance and board gender diversity on firm value with earnings management as a moderating variable. *Dinasti International Journal of Economics, Finance and Accounting*, *5*(1), 118–134. https://doi.org/10.38035/dijefa.v5i1.2103