

Carbon Emission Disclosure, ESG Scores, and Firm Value: Evidence from LQ45 Energy and Mining Companies

Dinda Putri Adelia¹, Elan Nurhadi Purwanto^{2*}, Sunita Dasman³

^{1,2}Universitas Pertamina

³Universitas Pelita Bangsa

Email: elan.nurhadi@universitaspertamina.ac.id

Received: 10-07-2026 Revised : 28-07-2026 Accepted : 30-07-2026 Published : 31-07-2026

Abstract

This study examines the effect of carbon emission disclosure and Environmental, Social, and Governance (ESG) scores on firm value in energy and mining companies listed in the LQ45 Index on the Indonesia Stock Exchange during the 2020–2024 period. This study employs secondary data obtained from companies' annual reports and sustainability ratings. The sample was selected using purposive sampling, resulting in nine companies with a total of 45 firm-year observations. The data were analyzed using panel data regression with fixed-effects and generalized least squares estimations. The results indicate that carbon emission disclosure has no significant effect on firm value, whereas Environmental, Social, and Governance (ESG) scores have a significant negative effect on firm value. Simultaneously, carbon emission disclosure and Environmental, Social, and Governance (ESG) scores have a significant effect on firm value. These findings indicate that sustainability-related practices have not yet been positively reflected in market valuation, suggesting that investors may still perceive sustainability initiatives as additional costs rather than as long-term value drivers. The study concludes that the implementation of sustainability practices alone is insufficient to enhance firm value without corresponding market recognition and investor confidence.

Keywords: carbon emission disclosure, esg score, firm value, energy and mining sectors, indonesian capital market

Introduction

Climate change represents one of the most pressing global challenges, driven by the accumulation of greenhouse gases (GHGs), primarily CO₂, methane, and nitrous oxide, from fossil fuel combustion and deforestation (Jones et al., 2023). Atmospheric CO₂ concentrations have exceeded 420 ppm in 2024, approximately 50% above pre-industrial levels and the highest in 800,000 years (World Meteorological Organization [WMO], 2025). The global mean surface temperature in 2024 reached a record high of approximately 1.47°C above pre-industrial levels (National Aeronautics and Space Administration [NASA], 2024), contributing to extreme weather events, rising sea levels, and threats to food and water security (Gkouliaveras et al., 2025). In response, the United Nations embedded climate action within Sustainable Development Goal 13, while the Paris Agreement established multilateral commitments to limit temperature rise and strengthen emissions mitigation and transparency (United Nations Framework Convention on Climate Change [UNFCCC], 2021, 2025).

Indonesia is the largest carbon emitter in Southeast Asia, with cumulative emissions of approximately 15.7 billion tons of CO₂ and contributing around 1.32 billion tons of CO₂ equivalent in 2024, representing approximately 2.5% of total global emissions (Katadata, 2024, 2025). Despite ratifying the Paris Agreement and targeting net-zero emissions by 2060, Indonesia's emissions continue to rise. The government has established emission reduction targets of 31.89% through domestic efforts and up to 43.20% with international support by 2030 through the Enhanced Nationally Determined Contribution (E-NDC) (Kementerian Lingkungan Hidup dan Kehutanan [KLHK], 2024). The energy and mining sector is the country's largest emitting sector and is also responsible for land-use change, deforestation, and ecological degradation that further undermine natural carbon sinks (Ranjan & Gorai, 2024; Prasetyo et al., 2025), highlighting the need for sustainable management strategies in this sector.

Against this backdrop, sustainability encompassing the triple bottom line of profit, people, and planet has become a central agenda in global business and investment (Nogueira et al., 2023). Institutional investors and regulators increasingly require companies to disclose environmental and social performance as part of operational transparency (Chen et al., 2025). In Indonesia, capital market participation grew by 34.8% in 2024 (Kustodian Sentral Efek Indonesia [KSEI], 2025), intensifying competition among firms to attract increasingly selective investors who weigh both financial and non-financial indicators (Suprpto & Muslimin, 2025). The 2020–2024 period represents a critical transition phase, marked by post-pandemic risk restructuring, the implementation of the Sustainable Finance Roadmap, growing pressure for energy transition, and the strengthening of sustainability regulation (Otoritas Jasa Keuangan [OJK], 2021; Giwangkara, 2021).

Two key non-financial mechanisms through which firms respond to climate pressure are carbon emission disclosure and Environmental, Social, and Governance (ESG) scores. Carbon emission disclosure, encompassing the reporting of GHG emissions from operations, can enhance firm value by reducing information asymmetry and enabling investors to more accurately assess transition risks (Sutria et al., 2025; Purwaningsih & Suwasono, 2025). Its regulatory basis in Indonesia is provided by Presidential Regulation No. 98 of 2021, which establishes a carbon economic value framework promoting emissions measurement and reporting. ESG scores, meanwhile, provide a broader evaluation of corporate risk management across environmental, social, and governance dimensions (Dharmawati et al., 2024), with high-scoring firms tending to exhibit more stable market performance and superior long-term firm value (Khairunnisa & Widiastuty, 2023). In Indonesia, ESG-themed assets under management grew from IDR 42 billion to IDR 3.5 trillion over five years, confirming ESG's strategic relevance in investment decisions. Both practices are further supported by POJK No. 51/POJK.03/2017 and the Sustainable Finance Roadmap Phase II. From a theoretical standpoint, these disclosures are consistent with stakeholder theory, which argues that corporate sustainability depends on effectively managing the expectations of diverse stakeholders, including investors, regulators, and communities (Chen, 2025; Rahmadini et al., 2025).

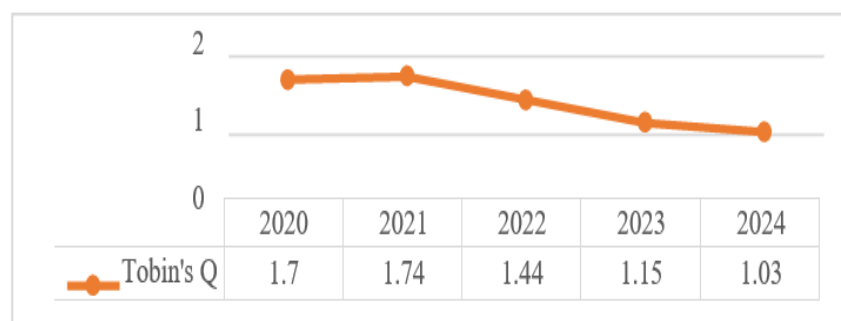


Figure 1. Average Firm Value of Energy and Mining Sector Companies in the LQ45 Index (2020–2024)

Source: Processed by the author (2025).

Firm value, measured using Tobin's Q, represents the primary metric through which investors assess corporate performance and future prospects (Hakim & Hindasah, 2025). Among LQ45 constituents in the energy and mining sector, the average Tobin's Q declined from 1.74 in 2021 to 1.03 in 2024, indicating that market valuations are increasingly converging toward book value. This declining trend raises the question of whether non-financial factors, such as environmental management and sustainability performance, contribute to changes in firm value (Fitriani & Lihan, 2019). Examining this relationship is therefore the central objective of the present study.

Prior studies present inconsistent findings regarding these relationships. Several studies report that carbon emission disclosure has a significant positive effect on firm value (Maryanti et al., 2025; Pangestika & Astuti, 2025; Fitriana et al., 2024), whereas others find no significant effect (Putri et al., 2025; Gayatri & Yuniarta, 2024). Likewise, positive effects of ESG scores on firm value have been documented by Ilma and Wahyuni (2025), Rayis et al. (2025), and Farrell and Dewi (2025), whereas Xaviera and Rahman (2023) reported no significant relationship. These inconsistent findings may be explained by differences in how investors interpret sustainability-related information. Carbon emission disclosure primarily signals corporate transparency and transition-risk management, whereas ESG scores capture broader environmental, social, and governance performance. In carbon-intensive industries such as energy and mining, investors may evaluate these two forms of sustainability information differently because they reflect distinct dimensions of corporate sustainability. Consequently, carbon emission disclosure and ESG performance may generate different market responses, providing a theoretical explanation for the inconsistent findings reported in previous studies.

Despite the growing body of literature, limited empirical evidence simultaneously examines carbon emission disclosure and ESG scores in Indonesia's energy and mining sector during the 2020–2024 period, a period characterized by substantial regulatory reforms and increasing investor attention to sustainability. This study addresses this gap by investigating whether these two sustainability indicators generate different market responses under Indonesia's evolving sustainability reporting environment.

This study contributes to the literature in several ways. First, it distinguishes the effects of carbon emission disclosure and ESG scores, enabling an assessment of whether investors respond differently to disclosure-based transparency and broader sustainability performance.

Second, by focusing on energy and mining companies, this study provides evidence from industries facing the highest transition risks, environmental impacts, and regulatory pressures, where sustainability information is expected to have greater economic relevance than in less carbon-intensive sectors. Third, the analysis is limited to companies included in the LQ45 Index, representing firms with high market capitalization and liquidity, thereby providing evidence from companies that receive substantial investor attention. Finally, the 2020–2024 observation period captures the implementation of strengthened sustainability regulations, increasing ESG adoption, and heightened investor attention to climate-related risks, allowing this study to provide evidence on how the Indonesian capital market values sustainability information during an important regulatory transition.

Stakeholder Theory

Freeman's (1984) stakeholder theory posits that firms are accountable not only to shareholders but to all parties affected by their operations including employees, customers, suppliers, communities, and regulators. In practice, companies tend to be more responsive to stakeholders with greater influence, shaping the nature and extent of corporate disclosures (Rahmawati, 2025). As a response to demands for environmental transparency, firms increasingly publish sustainability reports covering economic, social, and environmental performance to maintain stakeholder relationships (Behl et al., 2022). This theory is directly relevant to the present study, as carbon emission disclosure and ESG scores reflect corporate efforts to fulfill stakeholder expectations regarding sustainability and social responsibility, thereby supporting firm value over the long term.

Signaling Theory

Signaling theory (Spence, 1973) explains how management communicates information about a firm's condition to external parties in order to reduce information asymmetry. Signals are interpreted positively or negatively by recipients, influencing their investment decisions. Under conditions of asymmetric information, investors may be unable to distinguish between high- and low-quality firms, resulting in valuations that do not reflect true firm worth. Corporate reporting both financial and non-financial serves as a mechanism for conveying credible signals to analysts and investors (Christy & Sofie, 2023; Lee et al., 2022). In this study, carbon emission disclosure and ESG scores constitute non-financial signals that enhance corporate credibility, reduce information asymmetry, and ultimately contribute to higher firm value.

Firm Value

Firm value reflects market assessments of a company's prospects, governance quality, and capacity to generate future economic value (Brigham & Houston, 2022). Damodaran (2012) defines it as an estimate of intrinsic business worth based on future cash flow potential and associated risk levels, encompassing both historical performance and market expectations regarding growth and management quality. This study employs Tobin's Q as the firm value proxy, calculated by comparing a firm's market value to the book value of its assets (Tobin, 1969). A Tobin's Q greater than one indicates that the market values the firm above its book value reflecting value creation and growth potential while a value approaching or below one signals diminishing market confidence. The key advantage of Tobin's Q lies in its capacity to

capture both tangible and intangible assets and to account for the full capital structure, offering a more comprehensive valuation than traditional ratios such as PBV or PER (Chung & Pruitt, 1994).

$$Tobin's Q = \frac{MVE + Debt}{Tot. Asset}$$

$$MVE = Closing stock price \times Number of outstanding shares$$

Carbon Emission Disclosure

Carbon emission disclosure refers to the reporting of qualitative and quantitative information on GHG emission management including energy use, operational performance, and emission reduction targets presented in sustainability reports (Rusmana & Purnaman, 2020; Choi et al., 2013). This disclosure informs investors, regulators, and the public of a firm's carbon footprint and its strategies for mitigating climate-related risks (Arofah & Khomsiyah, 2023). Consistent disclosure signals sound corporate governance and responsiveness to stakeholder expectations, thereby reinforcing investor confidence and long-term firm reputation (Darmawan & Firmansyah, 2025).

This study measures carbon emission disclosure (CED) using the GRI 305 index, which encompasses seven disclosure items covering direct (Scope 1), indirect energy (Scope 2), other indirect (Scope 3) GHG emissions, emission intensity, emission reductions, ODS emissions, and NO_x/SO_x emissions. GRI 305 is adopted because the majority of Indonesian firms use GRI standards in sustainability reporting (Ekasari, 2021). Each item is scored dichotomously (1 = disclosed, 0 = not disclosed), yielding a maximum score of 18 sub-items. The CED index is computed as:

$$CED = \frac{No. Items Disclosed}{Tot. Items (Max. 18)} \times 100\%$$

ESG Score

Environmental, Social, and Governance (ESG) is a framework for measuring a firm's sustainability impact and ethical conduct, first introduced by the UN Principles for Responsible Investment (UNPRI) in 2006 (Fu & Li, 2023). ESG scores provide a quantitative measure of sustainability performance across three pillars environmental impact, social responsibility, and governance practices and serve as key indicators used by investors to assess non-financial risks and investment opportunities (Alareeni & Hamdan, 2020). As ESG integration in investment decision-making expands, firms with strong ESG performance tend to attract greater investor confidence and command higher market valuations (Khairunnisa & Widiastuty, 2023).

This study obtains ESG scores from the Refinitiv Eikon database, which calculates scores based on 186 indicators across ten categories representing environmental, social, and governance performance drawn from publicly available information (Refinitiv, 2023). The scores range from 0 to 100, with higher scores indicating stronger sustainability performance. Refinitiv is selected due to its comprehensive coverage, methodological transparency, and widespread use in academic research on ESG and firm value.

Hypotheses

This study examines the relationships between carbon emission disclosure, ESG score, and firm value among energy and mining sector companies listed in the LQ45 index on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. Drawing on stakeholder theory, signaling theory, and evidence from prior empirical studies, the following hypotheses are proposed:

- H1: Effect of Carbon Emission Disclosure on Firm Value
- H2: Effect of ESG Score on Firm Value
- H3: Simultaneous Effect of Carbon Emission Disclosure and ESG Score on Firm Value

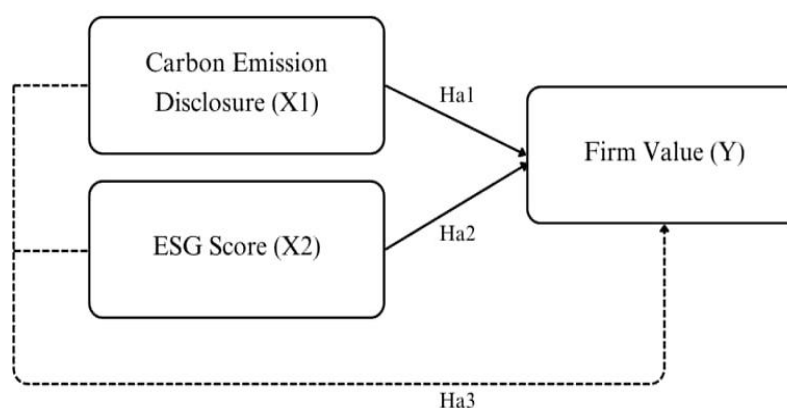


Figure 2. Research Framework

Method

This study employs a quantitative descriptive research design using secondary data. The quantitative approach is applied to examine the effect of carbon emission disclosure and ESG scores on firm value through statistical testing, while the descriptive component characterizes the patterns and trends observed across the sample period (Sugiyono, 2019). Secondary data were obtained from two sources: (1) annual and sustainability reports of listed companies accessed through the Indonesia Stock Exchange (IDX) website, used to calculate the Carbon Emission Disclosure (CED) index based on GRI 305; and (2) ESG scores retrieved from the Refinitiv Eikon database.

The population of this study comprises all companies in the energy and mining sector listed on the LQ45 index of the Indonesia Stock Exchange during the 2020–2024 period. Sample selection was conducted using purposive sampling, with the following criteria: (1) the company was consistently listed in the LQ45 index throughout the observation period; (2) the company published sustainability reports disclosing GHG emission information in accordance with GRI 305 standards; and (3) ESG score data were available on the Refinitiv Eikon database for the entire observation period. The application of these criteria yielded a final sample of 9 companies observed over 5 years, resulting in 45 firm-year observations. The data were analyzed using panel data regression with fixed effects estimation,

Results and Discussion

Descriptive Analysis of Variables

Table 1. Descriptive Analysis of Firm Value, CED and ESG Score

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Value (Tobin's Q)	45	1.410	0.828	0.73	5.26
CED (%)	45	77.775	26.123	28.57	100
ESG Score	45	66.270	14.662	28.21	87.94

Source: STATA17 output, 2025

The dataset comprises 45 firm-year observations drawn from 9 companies over 2020–2024. Firm value (Tobin's Q) averages 1.41, indicating that market value generally exceeds book value across the sample. The minimum of 0.73 (PGAS, 2023) and maximum of 5.26 (MDKA, 2021) reflect moderate cross-sectional variation ($SD = 0.83$). The CED mean of 77.78% suggests that most firms disclosed approximately 5–6 of the 7 GRI 305 items; however, the high standard deviation (26.12) signals considerable disparity in disclosure practices. ESG scores average 66.27, reflecting mid-to-high sustainability performance overall, with scores ranging from 28.21 (MDKA, 2021) to 87.94 (INCO, 2022) and a standard deviation of 14.66, indicating meaningful variation in ESG implementation across the sample.

Panel Model Selection

Table 2. Panel Model Selection Test

Test	Result
Chow Test: $F(8, 34)$	8.69
Prob > F	0.0000
Hausman Test: $\chi^2(2)$	9.80
Prob > χ^2	0.0074
Selected Model	Fixed Effect Model (FEM)

Source: STATA17 output, 2025

The Chow test yielded Prob > F = 0.0000, rejecting the Common Effect Model in favor of the Fixed Effect Model (FEM). The Hausman test subsequently confirmed FEM as the preferred specification ($\chi^2 = 9.80$; Prob > $\chi^2 = 0.0074$). Accordingly, all estimations are based on FEM.

Classical Assumption Tests

Table 3. Classical Assumption Tests

Test	Statistic	Result
Multicollinearity (r: CED–ESG)	0.6505	No violation (< 0.80)
Heteroscedasticity (Wald $\chi^2(9)$)	74.78 (p = 0.000)	Heteroscedasticity detected

GLS Correction	Applied	Homoscedastic; no autocorrelation
----------------	---------	-----------------------------------

Source: STATA17 output, 2025

The correlation between CED and ESG ($r = 0.6505$) is below the 0.80 threshold, confirming no multicollinearity. The modified Wald test detected heteroscedasticity (Prob > $\chi^2 = 0.0000$). The model was therefore re-estimated using Generalized Least Squares (GLS), which corrects for both heteroscedasticity and serial correlation by incorporating the error covariance structure into the estimation (Gujarati & Porter, 2013). Post-GLS diagnostics confirmed homoscedasticity and no autocorrelation.

Multiple Linear Regression Results

Table 4. GLS Regression Results (Dependent Variable: Tobin's Q)

Variable	Coeff.	Std. Err.	z	P > z
CED	-0.6175	0.5262	-1.17	0.241
ESG Score	-0.0217	0.0093	-2.32	0.020
Constant	3.3342	0.4831	6.90	0.000

Source: STATA17 output, 2025

$$\text{Tobin's Q} = 3.3342 - 0.6175 \text{ CED} - 0.0217 \text{ ESG} + \varepsilon$$

Prior to final estimation, the panel data were tested for violations of the classical linear regression assumptions (Table 3). The correlation between CED and ESG ($r = 0.6505$) fell below the 0.80 threshold, indicating no multicollinearity problem. However, the Modified Wald test for groupwise heteroskedasticity was significant ($\chi^2(9) = 74.78, p = 0.000$), indicating that the fixed-effects residuals were heteroskedastic across panels. Because this violation biases the standard errors of the fixed-effects estimator, the model was re-estimated using Feasible Generalized Least Squares (FGLS), which incorporates the estimated error covariance structure to correct for heteroskedasticity (Gujarati & Porter, 2013). Table 4 reports these FGLS results as the final model, not a continuation of the uncorrected fixed-effects specification.

The constant (3.334) represents the baseline firm value when both independent variables equal zero. CED carries a negative but statistically insignificant coefficient ($\beta = -0.618; p = 0.241$). The ESG score coefficient is negative and significant ($\beta = -0.022; p = 0.020$), indicating that a one-unit increase in ESG score is associated with a 0.0217-unit decrease in Tobin's Q.

Table 5. Coefficient of Determination

R-Squared	Value
Within	0.589
Between	0.246
Overall	0.281

Source: STATA17 output, 2025

The overall R^2 of 0.281 indicates that carbon emission disclosure (CED) and ESG score jointly explain 28.1% of the variation in firm value, while the remaining 71.9% is attributable to other factors outside the model.

Table 6. Partial Test Results

Variable	Coeff.	z	P > z	Decision
Constant	3.334	6.90	0.000	—
CED	-0.617	-1.17	0.241	H_{01} accepted / H_{a1} rejected
ESG Score	-0.021	-2.32	0.020	H_{a2} accepted

Source: STATA17 output, 2025

H_1 : The CED variable yields $P > |z| = 0.241$, which exceeds the 5% significance threshold ($0.241 > 0.05$). Accordingly, H_{01} is accepted and H_{a1} is rejected: carbon emission disclosure does not significantly affect firm value.

H_2 : The ESG score variable yields $P > |z| = 0.020$, which is below the 5% threshold ($0.020 < 0.05$), with a coefficient of -0.021. Accordingly, H_{02} is rejected and H_{a2} is accepted: ESG score has a significant negative effect on firm value, indicating that a one-unit increase in ESG score is associated with a 0.021-unit decrease in Tobin's Q.

Table 7. Simultaneous Test Results

Test	Value
Wald $\chi^2(2)$	17.89
Prob > χ^2	0.0001
χ^2 critical value (df=2, $\alpha=5\%$)	5.99
Decision	H_{a3} accepted

Source: STATA17 output, 2025

The Wald χ^2 statistic of 17.89 exceeds the critical value of 5.99, and $\text{Prob} > \chi^2 = 0.0001 < 0.05$. Accordingly, H_{03} is rejected and H_{a3} is accepted: carbon emission disclosure and ESG score simultaneously and significantly influence firm value. This confirms that the overall regression model is statistically significant and that both independent variables jointly explain meaningful variation in firm value.

Discussion

Carbon Emission Disclosure on Firm Value (H_1)

The partial test result for the CED variable ($p = 0.241$) indicates that H_{01} is accepted; carbon emission disclosure does not significantly affect the firm value of energy and mining sector companies listed in the LQ45 index during 2020–2024. This finding is consistent with Putri et al. (2025), Fanda et al. (2024), and Leilani et al. (2025) [53,54].

The absence of a significant effect can be attributed to the voluntary nature of carbon emission disclosure in Indonesia, which remains unsupported by binding regulations and enforcement mechanisms. From a signaling theory perspective, voluntary disclosures lacking

independent verification tend to be perceived by the market as weak signals information whose credibility and reliability remain uncertain (Asyifa, 2022; Houten & Wedari, 2023) [55,56]. Consequently, management has limited incentive to disclose emissions information comprehensively, and such disclosures have yet to function as material signals in investment decision-making.

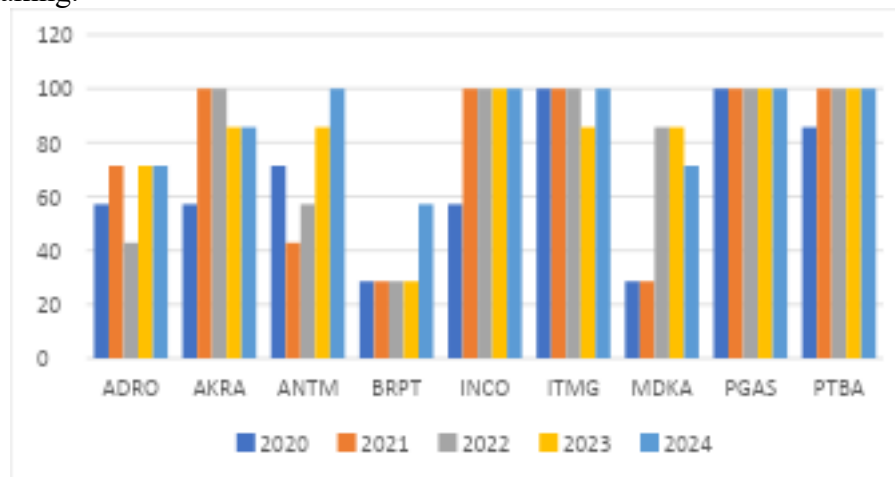


Figure 3. Carbon Emission Disclosure of Sample 2020-2024

Source: Processed data by the author, 2025

Descriptive analysis further reveals that only five of the nine sample companies PGAS, PTBA, ITMG, AKRA, and INCO reported CED levels above the sample mean of 77.77%, while the remaining four fell below average, with some declining over time. A comparison between PGAS, the highest discloser, and BRPT, the lowest discloser, illustrates this disconnect: BRPT maintained a Tobin's Q above 1 throughout the observation period, while PGAS consistently recorded values below 1 suggesting that firm value is driven by factors other than emissions transparency.

This pattern reflects the behavior of investors in Indonesia's capital market, who tend to prioritize short-term financial performance over non-financial disclosures (Ott & Schiemann, 2023; Rangga & Kristanto, 2023) [57,58]. For LQ45 stocks specifically, investment decisions are predominantly guided by financial stability and return potential, rendering non-financial disclosures such as CED less consequential in valuation (Dina & Wahyuningtyas, 2022) [59]. Moreover, high emissions disclosure without accompanying mitigation strategies may even generate negative investor perceptions (Ott & Schiemann, 2023) [57]. These findings diverge from Maryanti et al. (2025) [23] and Fitriana et al. (2024) [25], differences attributable to variations in sample characteristics, observation periods, and the regulatory maturity of sustainability reporting across study contexts.

ESG Score on Firm Value (H2)

The ESG score exerts a significant negative effect on firm value ($\beta = -0.021$; $p = 0.020$), supporting H_{a2}. This finding aligns with Paramitha (2024) [60] and Xaviera (2023) [31]. In the energy and mining sector, ESG implementation requires substantial capital allocation spanning clean technology investment, emissions and waste management, post-mining rehabilitation, CSR programs, and governance improvements. These costs are immediately reflected in

financial statements, whereas the economic benefits of ESG tend to materialize only over the long term. Consequently, markets respond faster to ESG cost burdens than to their anticipated future value.

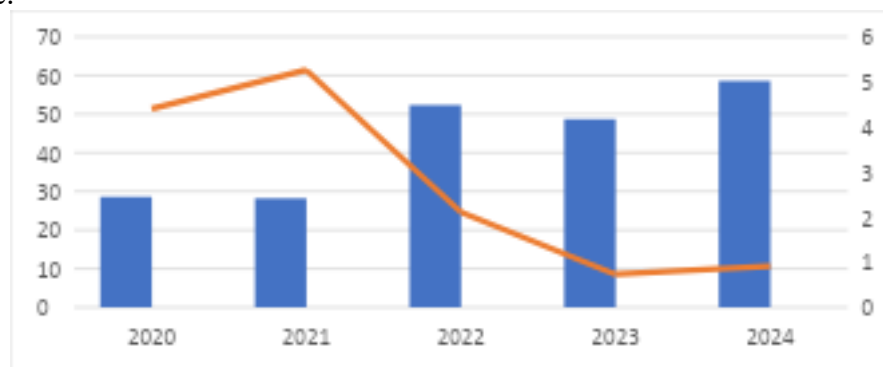


Figure 4. Comparison of ESG Scores and Firm Value of Perusahaan Gas Negara (PGAS), 2020–2024

Source: Processed data by the author, 2025

From a signaling theory perspective, high ESG expenditure may be interpreted as a negative signal regarding near-term profitability, leading investors to treat sustainability investment as a value-reducing obligation rather than a value-creating strategy (Surroca et al., 2010) [61]. ESG resource allocation may further divert capital from directly value-generating activities representing an opportunity cost that erodes shareholder wealth for return-oriented investors (Vlaviorine et al., 2023) [62]. Unlike markets in the United States and Europe, where strong ESG performance is rewarded through green financing access and institutional investor preference, the incentive mechanisms for ESG in Indonesia remain underdeveloped, limiting its translation into higher market valuation (Rahat & Nguyen, 2024) [63]. These findings are consistent with Behl et al. (2022) [16] and Arofah et al. (2023) [36], who document a short-term negative relationship between intensive ESG implementation and firm value in high-environmental-risk sectors.

CED and ESG Score on Firm Value (H3)

The Wald test confirms that CED and ESG score jointly and significantly influence firm value ($\chi^2 = 17.89$; $p = 0.0001$), supporting H_{a3} , consistent with Rahmawati (2025). Although neither variable independently exerts a positive effect, their combined significance suggests that investors evaluate environmental and sustainability information as an integrated informational package rather than in isolation. In the energy and mining sector, the joint disclosure of emissions and ESG performance signals overall sustainability commitment encompassing regulatory compliance, risk management, and social responsibility which collectively shapes market perception of long-term corporate risk.

The negative direction of these combined effects, however, indicates that sustainability disclosures are still predominantly perceived as sources of cost and compliance risk in the short term, rather than drivers of value creation particularly in capital-intensive, high-emission industries. These findings suggest that the effective integration of sustainability disclosures into firm valuation requires strengthened regulatory enforcement, credible verification

mechanisms, and the development of ESG-specific incentive structures within Indonesia's capital market framework.

Conclusion

Based on the statistical analyses conducted, it can be concluded that carbon emission disclosure does not have a significant effect on firm value. In contrast, ESG score has a significant negative effect on firm value. Simultaneously, carbon emission disclosure and ESG score have a significant effect on firm value. The adjusted R-square value 28.1% of the model indicates that a substantial proportion of the variation in firm value can be explained by carbon emission disclosure (X1) and ESG score (X2), while the remaining variation is influenced by other factors outside the scope of this study. The limitation of this study is that the research sample is limited to energy and mining companies included in the LQ45 Index listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period, which may not fully represent firms in other sectors or companies with different sustainability characteristics. As a recommendation for future research, it is suggested to include additional variables that may influence firm value, such as environmental performance, carbon emission intensity, environmental costs, good corporate governance, or macroeconomic indicators. Future studies are also encouraged to expand the research scope by including other industrial sectors and extending the observation period to better capture the long-term impact of sustainability practices on firm value.

References

- Alareeni, B. A., & Hamdan, A. (2020). ESG impact on performance of US S&P 500-listed firms. *Corporate Governance*, 20(7), 1409–1428.
- Arofah, S. N., & Khomsiyah. (2023). Pengaruh good corporate governance dan environmental social governance terhadap nilai perusahaan dengan kinerja keuangan sebagai moderasi. *Jurnal Informatika Ekonomi Bisnis*, 5(1), 125–133.
- Asyifa, D. A., & Burhany, D. I. (2022). Carbon emission disclosure and environmental performance effect on firm value. *International Journal of Arts and Social Science*, 5(7), 193.
- Behl, A., Kumari, P. S. R., Makhija, H., & Sharma, D. (2022). Exploring the relationship of ESG score and firm value using cross-lagged panel analyses: Case of the Indian energy sector. *Annals of Operations Research*, 313(1), 231–256.
- Brigham, E. F., & Houston, J. F. (2022). *Fundamentals of Financial Management* (16th ed.). Cengage Learning.
- Chen, M. (2025). Tinjauan luas pengungkapan corporate social responsibility (CSR): Tata kelola, struktur kepemilikan, dan kinerja perusahaan. Owner: Riset dan Jurnal Akuntansi, 9(3), 1833–1850.;
- Chen, X., Chen, Z., Torsin, W., Tsang, A., & Zeng, X. (2025). Mandatory ESG reporting and cross-listing activities: Worldwide evidence. *The British Accounting Review*, 101706.
- Choi, B. B., Lee, D., & Psaros, J. (2013). An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review*, 25(1), 58–79.
- Christy, E., & Sofie. (2023). Pengaruh pengungkapan environmental, social, dan governance terhadap nilai perusahaan. *Jurnal Ekonomi Trisakti*, 3(2), 3899–3908.

- Chung, K. H., & Pruitt, S. W. (1994). A simple approximation of Tobin's Q. *Financial Management*, 23(3), 70–74.
- Damodaran, A. (2012). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* (3rd ed.). John Wiley & Sons.
- Darmawan, L., & Firmansyah, A. (2025). Carbon emission disclosure, carbon performance, and firm value: Exploring intellectual capital's role. *Jurnal Dinamika Akuntansi*, 17(1), 1–15.
- Dharmawati, T., Gultom, J., Indrianti, M. A., Gobel, Y. A., & Suhairin, S. (2024). Pengaruh ESG (Environmental, Social, and Governance) dan keputusan keuangan terhadap kinerja keuangan perusahaan. *Jurnal Ilmiah Edunomika*, 8(2).
- Dina, D. A. S., & Wahyuningtyas, E. T. (2022). Pengaruh profitabilitas, leverage, dan ukuran perusahaan terhadap nilai perusahaan (studi empiris pada perusahaan LQ45 di Bursa Efek Indonesia periode 2018–2020). *Accounting and Management Journal*, 6(1), 36–49.
- Ekasari, K., Eltivia, N., Indrawan, A. K., & Miharso, A. (2021). Corporate commitment to the environment: Evidence from sustainability reports of mining companies in Indonesia. *Indonesian Journal of Sustainability Accounting and Management*, 5(1), 1–10.
- Fanda, V., & Damayanti, P. F. (2024). Pengaruh pengungkapan emisi karbon, eco-efficiency, dan green innovation terhadap nilai perusahaan. *Jurnal Ilmiah Mahasiswa Akuntansi*, 13(1), 60.
- Farrell, M. C., & Dewi, F. G. (2025). Pengaruh pengungkapan environment, social, and governance (ESG) terhadap nilai perusahaan dengan keunggulan kompetitif sebagai variabel moderasi. *Jurnal Ekonomi, Akuntansi, dan Perpajakan*, 2(2), 53–60.
- Fitriana, A., Maharani, D. A., Amelia, S. R., & Pangestika, L. W. (2024). Pengungkapan emisi karbon untuk meningkatkan nilai perusahaan: Apakah kinerja keuangan mampu memoderasi? *Akuras: Jurnal Studi Akuntansi dan Keuangan*, 7(2), 407–420.
- Fitrianti, R. D., & Lihan, I. (2019). Pengaruh profitabilitas terhadap nilai perusahaan dengan corporate social responsibility sebagai variabel moderasi pada perusahaan perbankan yang terdaftar di BEI Indonesia periode 2012–2016. *Jurnal Bisnis dan Manajemen*, 15(3), 411–442.
- Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Boston: Pitman.
- Fu, T., & Li, J. (2023). An empirical analysis of the impact of ESG on financial performance: The moderating role of digital transformation. *Environmental Science*. <https://doi.org/10.3389/fenvs.2023.1256052>
- Gayatri, N. A. A., & Yuniarta, G. A. (2024). Pengaruh carbon emission disclosure, pengungkapan green accounting, kinerja lingkungan dan ukuran perusahaan terhadap nilai perusahaan pada indeks saham LQ45 tahun 2018–2022. *Jurnal Akuntansi Profesi*, 15(02), 356–370.
- Gitman, L. J., & Zutter, C. J. (2015). *Principles of Managerial Finance* (14th ed.). Pearson Education.
- Giwangkara, J. (2021). The urgency of renewable energy transition in Indonesia. *Kaukus Ekonomi Hijau*.
- Gkouliaveras, V., Kalogiannidis, S., Kalfas, D., & Kontsas, S. (2025). Effects of climate change on health and health systems: A systematic review of preparedness, resilience, and challenges. *International Journal of Environmental Research and Public Health*, 22(2), 232.

- Gujarati, D. N., & Porter, D. C. (2013). *Dasar-Dasar Ekonometrika* (Buku 2, Edisi 5; S. Wardhani & C. Mangunsong, Penerj.). Jakarta: Salemba Empat.
- Hakim, M. L., & Hindasah, L. (2025). Pengaruh profitabilitas, keputusan keuangan, struktur kepemilikan dan ukuran perusahaan terhadap nilai perusahaan. *Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA)*, 9(1), 908–932.
- Houten, E. S., & Wedari, L. K. (2023). Carbon disclosure, carbon performance, and market value: Evidence from Indonesia polluting industries. *International Journal of Sustainable Development and Planning*, 18(6), 1731–1740.
- Ilma, L. N., & Wahyuni, N. I. (2025). Pengaruh pengungkapan environmental, social and governance (ESG) terhadap nilai perusahaan pada perusahaan agroindustri di Indonesia. *E-Jurnal Akuntansi TSM*, 5(2), 303–312.
- Jones, M. W., Peters, G. P., Gasser, T., Andrew, R. M., Schwingshackl, C., Gütschow, J., ... & Le Quéré, C. (2023). National contributions to climate change due to historical emissions of carbon dioxide, methane, and nitrous oxide since 1850. *Scientific Data*, 10(1), 155.
- Katadata. (2024). Indonesia penghasil emisi karbon tertinggi di Asia Tenggara. Retrieved from <https://www.instagram.com/p/C-4j0vrSSXB/>; Katadata. (2025). Negara penyumbang emisi gas rumah kaca terbesar pada 2024. Retrieved from <https://databoks.katadata.co.id/infografik/2025/11/17/negara-penyumbang-emisi-gas-rumah-kaca-terbesar-pada-2024>
- Kementerian Lingkungan Hidup dan Kehutanan (KLHK). (2024). Enhanced Nationally Determined Contributions (ENDC). Retrieved from <https://kanalkomunikasi.pskl.menlhk.go.id/tag/enhanced-nationally-determined-contributions-endc/>
- Khairunnisa, R., & Widiastuty, E. (2023). Pengaruh ESG disclosure terhadap nilai perusahaan di Indonesia. *Jurnal Riset Akuntansi*, 25(1), 45–60.
- Kustodian Sentral Efek Indonesia (KSEI). (2025). Lonjakan investor tembus 20 juta SID, likuiditas pasar makin kuat? Retrieved from <https://akses.ksei.co.id/pusatinformasi/berita/694aa356fd8bb0998f8fd347>
- Lee, J.-H., & Cho, J.-H. (2021). Firm-value effects of carbon emissions and carbon disclosures — evidence from Korea. *International Journal of Environmental Research and Public Health*, 18(22), 12166.
- Leilani, A. B., & Andayani, S. (2025). Pengaruh pengungkapan emisi karbon dan profitabilitas terhadap nilai perusahaan. *Permana: Jurnal Perpajakan, Manajemen, dan Akuntansi*, 17(3), 283–299.
- Maryanti, E., Biduri, S., & Sari, H. M. K. (2025). Pengaruh carbon emission disclosure dan green intellectual capital terhadap kinerja keuangan dan nilai perusahaan. *Jurnal Akuntansi dan Manajemen*, 22(1), 34–50.
- National Aeronautics and Space Administration (NASA). (2024). Global Temperature - Earth Indicator. Retrieved from <https://science.nasa.gov/earth/explore/earth-indicators/global-temperature>
- Nogueira, E., Gomes, S., & Lopes, J. M. (2023). Triple bottom line, sustainability, and economic development: What binds them together? A bibliometric approach. *Sustainability*, 15(8), 6706.
- Otoritas Jasa Keuangan (OJK). (2021). Roadmap Keuangan Berkelanjutan Tahap II (2021–2025). Retrieved from <https://ojk.go.id/id/berita-dan->

- kegiatan/publikasi/Pages/Roadmap-Keuangan-Berkelanjutan-Tahap-II-(2021-2025).aspx
- Ott, C., & Schiemann, F. (2023). The market value of decomposed carbon emissions. *Journal of Business Finance & Accounting*, 50(1–2), 3–30.
- Pangestika, F. O. W., & Astuti, C. D. (2025). Pengungkapan emisi karbon dan environmental performance terhadap nilai perusahaan. *Ensiklopedia Social Review*, 7(1), 62–68.
- Paramitha, I. A. P. C., & Devi, S. (2024). Pengaruh environmental, social, governance (ESG) score dan struktur modal terhadap nilai perusahaan. *Jurnal Akuntansi dan Investasi*, 10(2), 156–170.
- Prasetyo, M. H., Baderan, D. W. K., & Hamidu, M. S. (2025). Dampak kerusakan lingkungan akibat eksploitasi sumber daya mineral dari kegiatan pertambangan. *Hidroponik: Jurnal Ilmu Pertanian dan Teknologi dalam Ilmu Tanaman*, 2(2), 01–11.
- Purwaningsih, E., & Suwasono, H. (2025). Determinasi pengungkapan emisi karbon oleh perusahaan energi dan transportasi. *Jurnal Ilmiah Edunomika*, 9(4).
- Putri, A., Ananda, R. F., Dalimunthe, H., & Rahman, F. (2025). Pengaruh pengungkapan emisi karbon, kinerja lingkungan dan corporate social responsibility terhadap nilai perusahaan pada perusahaan pertambangan yang terdaftar di Bursa Efek Indonesia tahun 2020–2023. *Jurnal Manajemen dan Akuntansi*, 5(1), 265–281.
- Rahat, B., & Nguyen, P. (2024). The impact of ESG profile on firm valuation in emerging markets. *International Review of Financial Analysis*, 95, 103361.
- Rahmadini, D., Saputra, P. H., & Nurfadillah, M. (2025). Pengaruh komitmen hijau dan green intellectual capital terhadap keunggulan kompetitif pada perusahaan pertambangan batu bara di Indonesia. *Balance: Jurnal Akuntansi dan Manajemen*, 4(2), 427–441.
- Rahmawati, F. (2025). Pengaruh pengungkapan emisi karbon dan ESG terhadap perusahaan pertambangan di Indonesia periode 2021–2024. Undergraduate Thesis, UIN Kiai Haji Achmad Siddiq Jember.
- Rangga, E. N. S., & Kristanto, S. B. (2023). Pengungkapan emisi karbon, biaya CSR, profitabilitas, dan kebijakan hutang terhadap nilai perusahaan. *Jurnal Riset Akuntansi dan Keuangan*, 19(1), 67–82.
- Ranjan, A. K., & Gorai, A. K. (2024). Assessment of global carbon dynamics due to mining-induced forest cover loss during 2000–2019 using satellite datasets. *Journal of Environmental Management*, 371, 123271.
- Rayis, D. A., Juanda, A., & Wicaksono, A. P. N. (2025). The effect of ESG performance on firm value: Financial performance as a mediating variable. *Jurnal Akuntansi dan Auditing Indonesia*, 29(2), 286.
- Refinitiv. (2023). Environmental, Social and Governance Scores from Refinitiv.
- Rusmana, O., & Purnaman, S. M. N. (2020). Pengaruh pengungkapan emisi karbon dan kinerja lingkungan terhadap nilai perusahaan. *Jurnal Ekonomi dan Bisnis*, 22(2), 89–105.
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355–374.
- Sugiyono. (2022). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.
- Suprpto, S. A. A., & Muslimin. (2025). Pengaruh return on asset terhadap nilai perusahaan: Studi literatur. *Prosiding SENASHTEK 2025*, 1258–1263.

	JLMK : Jurnal Lentera Manajemen Keuangan Volume 04 No 02 Agustus 2026 E ISSN : 2986-5654 https://lenteranusa.id/	
---	---	---

- Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management Journal*, 31(5), 463–490.
- Sutria, I., Rahmadani, F., Khatima, H., & Ramadhani, D. P. (2025). Peran green accounting dalam pengambilan keputusan keuangan berkelanjutan: Studi literatur. *Jurnal Aktiva: Riset Akuntansi dan Keuangan*, 7(1), 10–24.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1(1), 15–29.
- United Nations Framework Convention on Climate Change (UNFCCC). (2021). COP26 reaches consensus on key actions to address climate change. Retrieved from <https://unfccc.int/news/cop26-reaches-consensus-on-key-actions-to-address-climate-change>; United Nations Framework Convention on Climate Change (UNFCCC). (2025). The Paris Agreement. Retrieved from <https://unfccc.int/process-and-meetings/the-paris-agreement>
- Vlaviorine, E., & Widianingsih, L. P. (2023). Penggunaan energi terbarukan, skor ESG, biaya modal dan biaya operasional pada kinerja keuangan. *Jurnal Akuntansi Kontemporer (JAKO)*, 15(2), 97–112.
- World Meteorological Organization (WMO). (2025). State of the Global Climate 2024. Retrieved from https://public.wmo.int/sites/default/files/2025-03/WMO-1368-2024_En
- Xaviera, A., & Rahman, A. (2023). Pengaruh kinerja ESG terhadap nilai perusahaan dengan siklus hidup perusahaan sebagai moderasi: Bukti dari Indonesia. *Jurnal Akuntansi Bisnis*, 16(2), 226.