

Environmental Disclosure As An Absolute Determinant Of The Profitability Of Nickel Mining Companies

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Abstract: Environmental, Social, and Governance (ESG) disclosure has become an important strategy for promoting sustainable business practices and enhancing corporate performance, particularly in environmentally sensitive industries such as nickel mining. However, previous studies have reported inconsistent findings regarding the relationship between ESG disclosure and financial performance. Therefore, this study examines the effects of overall ESG disclosure and its individual dimensions Environmental (E), Social (S), and Governance (G) on the financial performance of nickel mining companies listed on the Indonesia Stock Exchange during the 2021–2025 period. This study employs a quantitative approach using secondary data obtained from quarterly, annual, and sustainability reports. Panel data regression was estimated using the Panel EGLS method with cross-section weights, followed by a nonlinear regression analysis to further examine the relationship between the Social dimension and financial performance. The results indicate that overall ESG disclosure does not significantly affect Return on Equity (ROE). However, Environmental and Governance disclosures have positive and significant effects on financial performance, whereas Social disclosure has a negative but insignificant effect in the linear model. An additional nonlinear analysis suggests a possible, though not statistically significant, U-shaped pattern (turning point of 0.905), tentatively indicating that the financial benefits of social disclosure may emerge only after companies achieve a higher level of social disclosure; this nonlinear pattern warrants further confirmation in future research. These findings highlight the importance of evaluating ESG dimensions individually, as their contributions to financial performance differ and evolve over time.

Keywords: ESG; Environmental Disclosure; Social Disclosure; Governance Disclosure; ROE; Financial Performance; Nickel Mining

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1. Introduction

In recent years, the issues of climate change and sustainability have become major concerns in global business activities, including in Indonesia. Rising greenhouse gas emissions, environmental degradation, and demands for responsible business practices have prompted companies to focus not only on profits but also on environmental, social, and corporate governance aspects. The concept of Environmental, Social, and Governance (ESG) has thus emerged as a key indicator for assessing a company's sustainability and accountability to its stakeholders. ESG serves not only as a measure of a company's sustainability but also as a non-financial indicator that investors consider when evaluating a company's long-term prospects Saha and Khan, (2024) and Shan et al., (2025). Companies with strong ESG practices are considered to have a greater ability to maintain their reputation, build investor trust, and ensure long-term business sustainability Korankye et al., (2025). This

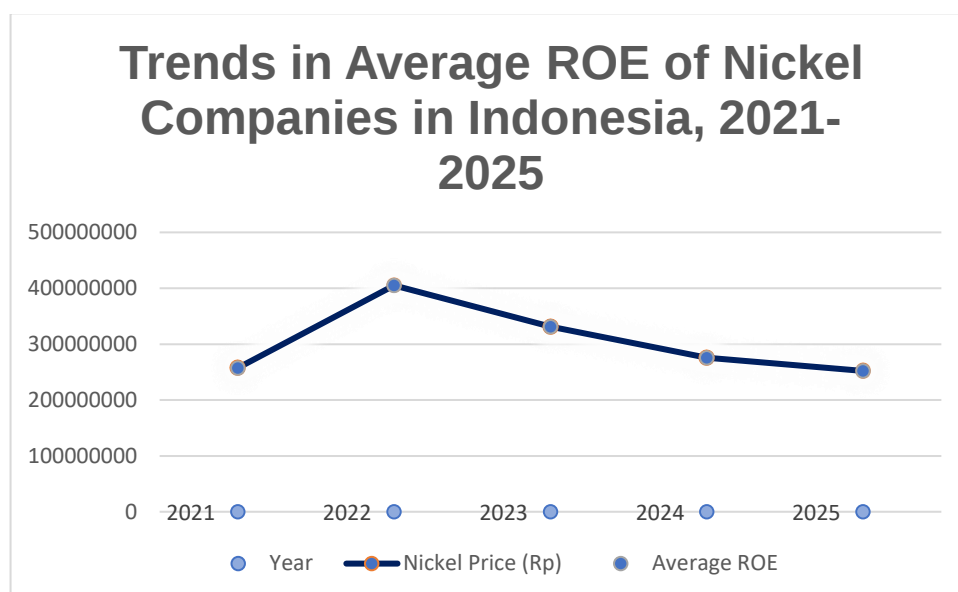
aligns with stakeholder theory, which emphasizes that companies must consider the interests of all stakeholders not just shareholders to maintain their legitimacy and business continuity.

The implementation of ESG is particularly important in Indonesia's nickel mining industry, which plays a strategic role in supporting the global energy transition. According to the United States Geological Survey (USGS, 2025), Indonesia possesses approximately 62 million metric tons of nickel reserves, representing about 44.3% of global reserves, and contributes more than 60% of global nickel production. Supported by Presidential Regulation No. 55 of 2019 concerning Battery-Based Electric Vehicles and Law No. 3 of 2020 on Mineral and Coal Mining, the Indonesian government continues to promote downstream mineral development and the electric vehicle industry. However, the expansion of nickel mining has also increased environmental degradation, carbon emissions, and social conflicts, requiring mining companies to strengthen ESG implementation to maintain legitimacy, transparency, and stakeholder confidence (Kusuma, 2025; Li & Tan, 2025; Soetanto & Agustia, 2025).

However, the expansion of nickel mining activities has also increased environmental and social challenges, including ecosystem degradation, water pollution, carbon emissions, and community conflicts. Consequently, nickel mining companies are expected to strengthen Environmental, Social, and Governance (ESG) practices to enhance transparency, maintain social legitimacy, and support long-term business sustainability Kusuma, (2025). Effective ESG implementation may also improve stakeholder trust and reduce information asymmetry between companies and investors Li and Tan, (2025); Soetanto and Agustia, (2025). In line with Stakeholder Theory, companies are expected to balance the interests of shareholders and other stakeholders to sustain long-term corporate performance (Didwania & Garg, 2025).

This phenomenon is reflected in the financial performance of nickel mining companies, as measured by Return on Equity (ROE). In this study, financial performance is measured by a company's ability to generate profits based on the capital invested by shareholders. ROE was chosen because the nickel mining industry is a capital-intensive sector; thus, the efficiency of equity management is a primary concern for investors in assessing a company's success. Furthermore, the implementation of ESG is expected not only to improve operational efficiency but also to create added value for shareholders, as reflected in an increase in ROE. Therefore, ROE is considered a more appropriate measure of a company's success in converting shareholder investments into profits compared to other profitability indicators.

ROE data for nickel mining companies for the 2021–2025 period shows fluctuations in the companies' financial performance. In 2022, global nickel prices rose significantly due to increased demand for raw materials for electric vehicles and disruptions to global supply chains caused by the Russia-Ukraine conflict. This surge in nickel prices boosted ROE for most companies in this sector. These conditions indicate that high global demand for nickel has a positive impact on the profitability of nickel mining companies in Indonesia. However, after 2022, nickel prices began to decline and fluctuate due to increased global supply and a global economic slowdown, thereby affecting the companies' ability to generate profits. In addition to internal company factors, the financial performance of nickel mining companies is also influenced by macroeconomic conditions. One commonly used indicator is Gross Domestic Product (GDP), as it reflects a country's level of economic activity. GDP growth indicates increased industrial activity, investment, infrastructure development, and demand for metal raw materials, including nickel. For nickel mining companies, rising GDP can drive both domestic metal consumption and exports through increased manufacturing activity and the electric vehicle industry. Therefore, GDP is used as a macroeconomic variable to assess a company's financial performance, allowing for a more accurate analysis of the impact of ESG on ROE. On the other hand, companies also face pressure to improve the quality of their ESG implementation, which requires additional investment in environmental, social, and corporate governance aspects (Dasilas and Karanović, 2025; Shan et al., 2025).



Sourced: Indonesia Stock Exchange (www.idx.co.id), processed by author

Figure 1. Development of the Average ROE of Nickel Companies in Indonesia, 2021-2025

Previous studies have reported inconsistent findings regarding the relationship between ESG and financial performance. Dasilas and Karanović, (2025), Prasad and Mondal, (2025), Shan et al., (2025) found that ESG improves corporate financial performance by enhancing competitiveness, sustainability, and investor confidence. In contrast, Ozata Canli and Sercemeli, (2025) reported that overall ESG disclosure does not significantly affect financial performance, although certain ESG dimensions may produce different effects. These inconsistent findings indicate that the relationship between ESG and corporate financial performance remains inconclusive across industries and countries.

Similar inconsistencies are also found in Indonesia. Oktavia, (2025) reported that ESG negatively affects firm value unless supported by green innovation, while Istiani and Kadarningsih, (2023) emphasized that financial performance is also influenced by effective financial management. Despite the growing body of ESG research, limited evidence is available for Indonesia's nickel mining industry, which is characterized by high environmental risk and strong dependence on global commodity prices. Therefore, further investigation is needed to determine whether overall ESG disclosure and its Environmental, Social, and Governance dimensions influence the financial performance of Indonesian nickel mining companies.

Based on these research gaps, this study examines the effect of ESG disclosure, both collectively and through its Environmental, Social, and Governance dimensions, on the financial performance of Indonesian nickel mining companies during 2021–2025, measured by Return on Equity (ROE). This study is expected to enrich the literature on ESG in the mining sector while providing practical implications for companies, investors, and policymakers in promoting sustainable mining practices and improving long-term corporate performance.

2. Preliminaries or Related Work or Literature Review

2.1 Stakeholder Theory, Legitimacy Theory, and Agency Theory

Stakeholder Theory argues that companies are responsible not only to shareholders but also to employees, customers, governments, investors, and local communities; therefore, transparent ESG practices can strengthen stakeholder trust and support long-term corporate performance Edeigba et al., (2026); Mapfumo, (2021); Saha and Khan, (2024). Legitimacy Theory suggests that companies, particularly those operating in environmentally sensitive industries such as mining, seek to align their activities with societal expectations through ESG disclosure to maintain legitimacy and enhance corporate reputation Ozata Canli and Sercemeli, (2025). Meanwhile, Agency Theory explains that ESG disclosure reduces information asymmetry between managers and shareholders by improving transparency, governance quality, and monitoring mechanisms, thereby increasing investor confidence and

supporting corporate performance Mapfumo, (2021). Together, these theories provide the conceptual foundation for explaining how ESG disclosure may influence the financial performance of nickel mining companies.

2.2 The Impact of Environmental, Social, and Governance (ESG) on Financial Performance

The implementation of ESG is viewed as a corporate strategy to enhance business sustainability, gain social legitimacy, and strengthen stakeholder trust. Based on stakeholder theory, companies that adopt responsible business practices tend to receive greater support from investors, the public, and the government, thereby enhancing their reputation and financial performance Korankye et al., (2025). Additionally, agency theory explains that ESG disclosure can increase transparency and reduce information asymmetry between management and investors Shan et al., (2025). Previous research has shown that ESG has a positive effect on a company's financial performance Korankye et al., (2025); Prasad and Mondal, (2025). Therefore, the following hypothesis is formulated:

H1: ESG has a positive effect on the financial performance of nickel mining companies in Indonesia

2.3 The Impact of Environmental Factors on Financial Performance

Environmental dimensions reflect a company's commitment to managing environmental impacts, such as emissions, waste, and the use of natural resources. According to legitimacy theory, companies that demonstrate concern for the environment will gain greater legitimacy and trust from the public Ozata Canli and Sercemeli, (2025). Good environmental disclosure can also enhance a company's reputation and reduce operational and legal risks. Research Dasilas and Karanović, (2025) demonstrates that the quality of environmental disclosure can improve corporate performance in industries with high levels of pollution. Thus, the following hypothesis is formulated:

H2: Environmental factors have a positive effect on the financial performance of nickel mining companies in Indonesia.

2.4 The Impact of Social Factors on Financial Performance

The social dimension relates to a company's relationships with employees, consumers, the community, and other stakeholders. According to stakeholder theory, good relationships with stakeholders can increase loyalty, productivity, and support for the company Korankye et al., (2025). In the nickel mining industry, effective management of social aspects can also minimize conflicts with the community and ensure the smooth operation of the company. Research Ozata Canli and Sercemeli, (2025) shows that social disclosure has a positive effect on a company's financial performance. Therefore, the proposed hypothesis is:

H3: Social factors have a positive effect on the financial performance of nickel mining companies in Indonesia.

2.5 The Impact of Governance on Financial Performance

The governance dimension encompasses corporate governance, transparency, and oversight mechanisms aimed at reducing conflicts of interest between management and shareholders. According to agency theory, good governance can enhance the effectiveness of oversight, the quality of decision-making, and investor confidence Ozata Canli and Sercemeli, (2025). In addition, effective governance also supports regulatory compliance and reduces corporate risk. Previous research indicates that companies with good governance tend to have higher financial performance Shan et al., (2025). Thus, the following hypothesis is formulated:

H4: Governance has a positive effect on the financial performance of nickel mining companies in Indonesia.

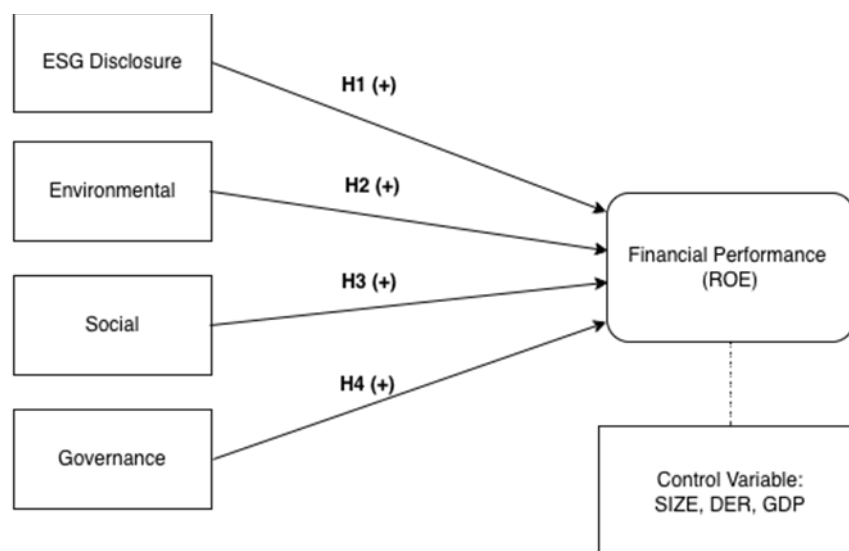


Figure 2. Conceptual framework of the study (developed by the author,2026).

3. Materials and Method

This study employed a quantitative approach with a causal associative research design to examine the effect of Environmental, Social, and Governance (ESG) disclosure on the financial performance of nickel mining companies listed on the Indonesia Stock Exchange (IDX) during the 2021-2025 period. The dependent variable is financial performance measured by Return on Equity (ROE), while the independent variables consist of ESG disclosure and its individual dimensions Environmental (E), Social (S), and Governance (G). firm Size (SIZE), Debt-to-Equity Ratio (DER), and Gross Domestic Product (GDP) are included as control variables.

The population consisted of 10 nickel mining companies listed on the Indonesia Stock Exchange during 2021–2025. The sample was selected using purposive sampling based on the following criteria: (1) companies continuously listed on the IDX during the observation period; (2) companies publishing complete quarterly financial statements; (3) companies publishing sustainability reports; and (4) companies providing complete data for all research variables. Based on these criteria, two companies were excluded, resulting in a final sample of 8 companies or 160 firm quarter observations.

Table 1 Operational Definition and Measurement of Variable

Variable	Formula/Indicator	Operational Definition
Financial Performance (ROE)	$ROE = \frac{\text{Net Income}}{\text{Total Equity}}$	Return on Equity (ROE) is a profitability ratio that measures a company's ability to generate net income from shareholders' equity. A higher ROE indicates that the company utilizes its equity more efficiently to generate profits for investors (Brigham & Houston, 2022).
Environmental, Social, and Governance (ESG)	$ESG = \sum \frac{\text{Disclosed ESG Items}}{32 \text{ ESG Indicators}}$	ESG disclosure reflects the extent to which a company reports environmental, social, and governance information in accordance with sustainability reporting standards. Higher ESG disclosure indicates greater corporate transparency and commitment to sustainable business practices (GRI Standards).

Environmental (E), Social (S), Governance (G)	$\text{Index} = \sum \frac{\text{Number of Disclosed Items}}{\text{Total applicable GRI Items}}$	Environmental, Social, and Governance disclosures are measured using the GRI Disclosure Index. Each dimension is calculated separately by dividing the number of disclosed items by the total applicable GRI indicators for that dimension (GRI Standards).
Firm Size (SIZE)	$\text{SIZE} = \ln(\text{Total Assets})$	Firm size represents the scale of a company's operations and economic resources. It is measured using the natural logarithm of total assets because larger firms generally possess greater resources and stronger operational capabilities (Common Financial Literature).
Leverage (DER)	$\text{DER} = \frac{\text{Total Liabilities}}{\text{Total Equity}}$	Debt to Equity Ratio (DER) measures the proportion of company financing obtained from debt relative to shareholders' equity. A higher DER indicates greater reliance on debt financing (Brigham & Houston, 2022).
Gross Domestic Product (GDP)	$\text{GDP Growth} = \frac{\text{GDP}_t - \text{GDP}_{t-1}}{\text{GDP}_{t-1}}$	Gross Domestic Product (GDP) represents the overall level of economic activity in Indonesia and is used as a macroeconomic control variable because economic growth influences industrial demand, investment, and corporate financial performance (BPS & Bank Indonesia).

Data collection was conducted using the documentation method, which involves gathering, recording, and processing data from quarterly reports and sustainability reports relevant to the research variables. The analysis was performed using descriptive statistics and panel data regression with EViews 14 software. Panel data regression was chosen because it combines time-series and cross-sectional data. The research model formulated is as follows:

$$\text{ROE} = \alpha + \beta_1 \text{ESG} + \beta_2 \text{SIZE} + \beta_3 \text{DER} + \beta_4 \text{GDP} + e$$

To test the influence of each ESG dimension, the following model was used:

$$\text{ROE} = \alpha + \beta_1 E + \beta_2 S + \beta_3 G + \beta_4 \text{SIZE} + \beta_5 \text{DER} + \beta_6 \text{GDP} + e$$

The regression model in this study was used to test the influence of Environmental, Social, and Governance (ESG) factors on corporate financial performance, as proxied by Return on Equity (ROE). The independent variable in this model is ESG, while firm size (SIZE), Debt-to-Equity Ratio (DER), and Gross Domestic Product (GDP) are used as control variables. The use of control variables aims to minimize estimation bias so that the impact of ESG on financial performance can be observed more accurately. In addition, this study also examines the effects of each ESG dimension Environmental (E), Social (S), and Governance (G) on ROE. In this model, α represents the constant, β is the regression coefficient for each variable, and e is the error term or other factors outside the research model.

4. Results and Discussion

4.1 Descriptive Statistic

Table 2. Descriptive Statistic

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
ROE	0.100994	0.072000	0.486000	-0.518000	0.123477
ESG	0.754800	0.672000	1.000000	0.438000	0.197755
Environmental (E)	0.820000	0.700000	1.700000	0.200000	0.438522
Sosial (S)	0.735000	0.700000	1.300000	0.300000	0.300566
Governance (G)	0.727500	0.700000	1.400000	0.400000	0.271022
SIZE	27.920190	27.975000	31.770000	24.170000	2.464069
DER	3.370250	2.635000	26.130000	0.180000	4.373661
GDP	9.930400	9.947000	10.078000	9.739000	0.115694

The average ROE is 0.100994, indicating that nickel mining companies generated an average return of 10.10% during the observation period, although profitability varied considerably across firms, as reflected by values ranging from -0.518 to 0.486 . The average ESG disclosure score is 0.754800, suggesting that companies generally disclosed a relatively high proportion of ESG information. Among the ESG dimensions, Environmental (E) recorded the highest average disclosure (0.820000), followed by Social (S) (0.735000) and Governance (G) (0.727500), indicating that environmental disclosure received greater emphasis than the other dimensions. Furthermore, the average values of the control variables are 27.920190 for Firm Size (SIZE), 3.370250 for Debt-to-Equity Ratio (DER), and 9.930400 for Gross Domestic Product (GDP), reflecting differences in company characteristics and macroeconomic conditions during the study period. Overall, these descriptive statistics indicate sufficient variation across the variables, supporting further panel regression analysis.

4.2 Panel Data Model Selection and Classical Assumption Tests

Table 3. Chow Test Result

Model	Effects Test	Statistic	Probability	Decision
Model 1 (ESG Disclosure)	Cross-section F	2.2352	0.0345	Fixed Effect Model
	Cross-section Chi-square	16.0792	0.0244	
Model 2 (ESG Dimensions: E, S, G)	Cross-section F	3.9676	0.0005	Fixed Effect Model
	Cross-section Chi-square	27.8632	0.0002	

The results show that Model 1 (ESG Disclosure) has a Cross-section F probability of 0.0345 and a Cross-section Chi-square probability of 0.0244, while Model 2 (ESG Dimensions: Environmental, Social, and Governance) records probability values of 0.0005 and 0.0002, respectively. Since all probability values are below the 5% significance level, the null hypothesis is rejected, indicating that the Fixed Effect Model (FEM) is preferred over the Common Effect Model for both regression models. Therefore, the analysis proceeds to the Hausman test to determine whether the Fixed Effect Model or the Random Effect Model provides the most appropriate estimation.

Table 4. Multicollinearity Test Result Model 1

Variable	ESG	SIZE	DER	GDP
ESG	1.0000	0.0134	0.1182	0.0192
SIZE	0.0134	1.0000	-0.3932	0.0795

DER	0.1182	-0.3932	1.0000	0.0848
GDP	0.0192	0.0795	0.0848	1.0000

Table 5. Multicollinearity Test Result Model 2

Variable	E	S	G	SIZE	DER	GDP
E	1.0000	0.7142	-0.6143	0.2037	-0.1037	0.0412
S	0.7142	1.0000	-0.3640	-0.1077	0.1859	-0.0158
G	-0.6143	-0.3640	1.0000	-0.1820	0.2397	0.0004
SIZE	0.2037	-0.1077	-0.1820	1.0000	-0.3932	0.0795
DER	-0.1037	0.1859	0.2397	-0.3932	1.0000	0.0848
GDP	0.0412	-0.0158	0.0004	0.0795	0.0848	1.0000

The results of the multicollinearity test indicate that there are no correlations among the independent variables exceeding the threshold of 0.90. Thus, it can be concluded that the research model is free from multicollinearity, and all variables can be used in the regression analysis.

Table 6. Heteroscedasticity Test Result

Model	Likelihood Ratio	df	Probability	Decision
Model 1 (ESG Disclosure)	263.5612	8	0.0000	Reject H_0 (Heteroscedasticity detected)
Model 2 (ESG Dimensions: E, S, G)	262.7600	8	0.0000	Reject H_0 (Heteroscedasticity detected)

The Panel Cross-section Heteroskedasticity LR Test was conducted to examine whether the residual variance remained constant across cross-sectional units. As presented in Table 5, Model 1 produced a likelihood ratio statistic of 263.5612 with a probability value of 0.0000, while Model 2 reported a likelihood ratio statistic of 262.7600 with the same probability value of 0.0000. Since the probability values for both models are below the 5% significance level, the null hypothesis of homoskedasticity is rejected, indicating the presence of heteroskedasticity in both panel data models. This condition is common in panel data because the sampled nickel mining companies differ in terms of firm size, capital structure, operational scale, and ESG disclosure practices, resulting in unequal error variances across firms. Therefore, to obtain efficient and reliable parameter estimates, the regression analysis was estimated using the Panel EGLS method with cross-section weights, which corrects for heteroskedasticity across cross-sectional units.

Table 7. Autocorrelation Test Result

Model	Durbin-Watson Stat	Criteria	Conclusion
Model 1 (ESG)	1.060385	The DW value ranges from -2 to +2	There is no autocorrelation
Model 2 (E, S, G)	1.156238	The DW value ranges from -2 to +2	There is no autocorrelation

The autocorrelation test was evaluated using the Durbin–Watson statistic. As shown in Table 7, the Durbin–Watson values are 1.060385 for Model 1 and 1.156238 for Model 2. These values indicate that the regression models do not exhibit serious autocorrelation after estimation using the Panel EGLS method with cross-section weights. Therefore, the estimated models are considered appropriate for subsequent hypothesis testing.

4.2 Regression Results

Table 8. Regression Result of ESG Disclosure on Financial Performance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.393126	0.655451	-0.599779	0.5496
ESG	0.149544	0.285012	0.524694	0.6006
SIZE	0.004645	0.032639	0.142307	0.8870
DER	-0.003211	0.001754	-1.831022	0.0691
GDP	0.026422	0.074103	0.356562	0.7219
Statistic	Value			
R-squared	0.203174			
Adjusted R-squared	0.14395			
F-statistic	3.430629			
Prob (F-statistic)	0.000287			
Durbin-Watson Stat	1.060385			

The regression results for Model 1, which examines the effect of ESG disclosure on the financial performance of nickel mining companies. The estimated coefficient of ESG is positive ($\beta = 0.149544$) but statistically insignificant ($p = 0.6006$), indicating that overall ESG disclosure does not have a significant effect on ROE. Similarly, the control variables, namely firm size (SIZE), leverage (DER), and gross domestic product (GDP), are also statistically insignificant at the 5% significance level. The model reports an R-squared value of 0.203174 and an adjusted R-squared of 0.143950, indicating that approximately 20.32% of the variation in ROE is explained by the independent and control variables included in the model. Furthermore, the F-statistic is 3.430629 with a probability value of 0.000287, suggesting that the model is jointly significant and appropriate for explaining the relationship between ESG disclosure and financial performance.

Table 9. Regression Result of Environmental, Social, Governance on Financial Performance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.739357	0.665052	-1.111727	0.2681
Environmental (E)	0.458604	0.152586	3.005555	0.0031
Social (S)	-0.253226	0.154105	-1.643203	0.1025
Governance (G)	0.332101	0.168053	1.976169	0.0500
SIZE	0.029980	0.031687	0.946116	0.3457
DER	-0.003073	0.001780	-1.726378	0.0864
GDP	-0.042080	0.081833	-0.514220	0.6079
Statistic	Value			
R-squared	0.209402			
Adjusted R-squared	0.139006			
F-statistic	2.974643			
Prob (F-statistic)	0.000694			
Durbin-Watson Stat	1.156238			

The regression results for Model 2, which examines the effects of the Environmental (E), Social (S), and Governance (G) dimensions on the financial performance of nickel mining companies. The results indicate that the Environmental (E) variable has a positive and significant effect on ROE ($\beta = 0.458604$; $p = 0.0031$), whereas the Social (S) variable has a negative but insignificant effect ($\beta = -0.253226$; $p = 0.1025$). The Governance (G) variable shows a positive effect with a probability value of 0.0500, indicating marginal statistical significance at the 5% level. Among the control variables, firm size (SIZE), leverage (DER), and gross domestic product (GDP) are not statistically significant. The model reports an R-squared value of 0.209402 and an adjusted R-squared value of 0.139006, indicating that

approximately 20.94% of the variation in ROE is explained by the independent and control variables included in the model. Furthermore, the F-statistic of 2.974643 with a probability value of 0.000694 indicates that the regression model is jointly significant and suitable for explaining the relationship between the ESG dimensions and financial performance.

4.3 Discussion

The Impact of ESG on Financial Performance

The regression results indicate that ESG disclosure has a positive but statistically insignificant effect on the financial performance of Indonesian nickel mining companies, with a coefficient of 0.149544 and a probability value of 0.6006. Since the probability value exceeds the 5% significance level, **H1 is rejected**, indicating that overall ESG disclosure does not significantly influence Return on Equity (ROE) during the 2021–2025 observation period. This finding suggests that although companies have implemented ESG disclosure practices, these efforts have not yet translated into improved profitability for shareholders.

From the perspective of Stakeholder Theory, companies that actively disclose ESG information are expected to strengthen relationships with stakeholders, enhance corporate reputation, and ultimately improve financial performance. Similarly, Legitimacy Theory argues that ESG disclosure helps firms gain social acceptance and maintain legitimacy, particularly in environmentally sensitive industries such as nickel mining. However, the insignificant result indicates that the benefits of ESG disclosure may require a longer period to be reflected in financial performance. In the nickel mining industry, profitability is more likely to be influenced by commodity price fluctuations, production efficiency, and operational performance than by aggregate ESG disclosure.

These findings are consistent with Ozata Canli and Sercemeli, (2025), who found that overall ESG disclosure does not significantly affect financial performance because its benefits are generally realized over the long term after substantial implementation costs. Similarly, Shan et al. (2025) argue that while ESG enhances corporate sustainability, its financial benefits are not always immediately reflected in profitability due to the influence of external factors. In contrast, the findings differ from Korankye et al. (2025) and Prasad and Mondal, (2025), who reported that ESG improves financial performance by strengthening corporate reputation, reducing business risk, and increasing investor confidence. These differences may be explained by the characteristics of the nickel mining industry, where profitability is highly dependent on fluctuations in global commodity prices. The results also support Oktavia, (2025), who argues that ESG implementation alone does not generate immediate economic benefits because companies must first incur substantial sustainability investments before creating long-term value.

The Impact of Environmental Factors on Financial Performance

The regression results indicate that the Environmental (E) variable has a positive and significant effect on the financial performance of Indonesian nickel mining companies, with a coefficient of 0.458604 and a probability value of 0.0031. Since the probability value is below the 5% significance level, **H2 is accepted**, indicating that higher environmental disclosure contributes to higher Return on Equity (ROE). This finding suggests that companies with greater transparency and commitment to environmental management tend to achieve better financial performance.

This result is consistent with Legitimacy Theory, which argues that companies operating in environmentally sensitive industries seek to maintain legitimacy by demonstrating responsible environmental practices. In the nickel mining industry, environmental disclosure reflects a firm's commitment to managing emissions, waste, land reclamation, and the sustainable use of natural resources. Such practices enhance corporate credibility and strengthen relationships with stakeholders, including investors, regulators, and local communities. From the perspective of Stakeholder Theory, greater environmental responsibility also increases stakeholder confidence, which can improve corporate reputation and support long-term financial performance.

These findings are consistent with Dasilas and Karanović, (2025), who reported that high-quality environmental disclosure improves corporate financial performance by reducing environmental risk and strengthening corporate reputation, particularly in environmentally sensitive industries. Similarly, Korankye et al., (2025) found that sustainable environmental practices enhance competitiveness and increase stakeholder confidence, thereby contributing positively to financial performance. However, the findings differ from Ozata Canli and Sercemeli, (2025), who reported that environmental disclosure negatively affects profitability

because firms incur substantial environmental compliance and implementation costs. This difference may be explained by the characteristics of Indonesia's nickel mining industry, where environmental responsibility has become increasingly important in maintaining regulatory compliance, social legitimacy, and long-term operational sustainability. Consequently, companies that disclose stronger environmental practices are more likely to improve stakeholder trust and enhance their financial performance.

The Impact of Social Factors on Financial Performance

The regression results indicate that the Social (S) variable has a negative but statistically insignificant effect on the financial performance of Indonesian nickel mining companies, with a coefficient of -0.253226 and a probability value of 0.1025 . Since the probability value exceeds the 5% significance level, **H3 is rejected**, indicating that social disclosure does not significantly affect Return on Equity (ROE). These findings suggest that the level of social disclosure has not yet become a significant determinant of corporate profitability during the observation period.

According to Stakeholder Theory, companies are expected to improve financial performance through investments in employee welfare, occupational health and safety, community development, and stakeholder engagement. However, the insignificant result suggests that the economic benefits of these social initiatives may require a longer period to materialize because companies incur substantial implementation costs before obtaining financial returns.

To further investigate the insignificant linear relationship between social disclosure and financial performance, this study performs an additional nonlinear regression analysis by incorporating the squared Social variable (S^2). The nonlinear regression model is specified as follows:

$$ROE = \beta_0 + \beta_1 S + \beta_2 S^2 + e$$

Where ROE represents Return on Equity, S denotes the Social disclosure score, S^2 represents the squared Social disclosure variable, β_0 is the constant, β_1 and β_2 are the regression coefficients, and e is the error term.

Table 10. Regression Result of the Nonlinear Analysis of Social Disclosure and ROE

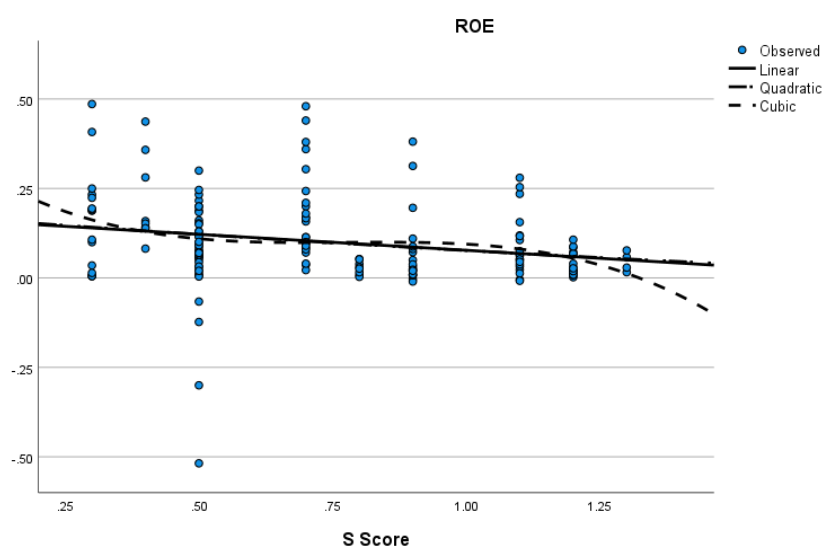
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Social (S)	-0.900480	0.435174	-2.069242	0.0402
Social ² (S ²)	0.497666	0.373464	1.332569	0.1847
Model Statistics	Value			
R-squared	0.144500			
Adjusted R-squared	0.093170			
F-statistic	2.821612			
Prob(F-statistic)	0.004387			

The coefficient of the Social variable is negative ($\beta_1 = -0.900480$), while the coefficient of the squared Social variable is positive ($\beta_2 = 0.497666$). Although the squared term (S^2) is not statistically significant at conventional levels ($p = 0.1847$), the sign pattern of the two coefficients is suggestive of a potential U-shaped relationship between social disclosure and financial performance, which should be interpreted as a tentative, exploratory pattern rather than a statistically confirmed nonlinear effect. If the pattern is taken at face value, it would suggest that companies initially incur relatively high costs when implementing social responsibility programs, causing financial performance to decline in the short term, while at higher levels of disclosure the long-term benefits gradually outweigh the initial implementation costs. However, because the quadratic term does not reach statistical significance, this explanation should be treated as a plausible hypothesis for future research rather than a confirmed finding, and it is offered here only as a preliminary indication that warrants confirmation with a larger sample or longer observation period.

The turning point is calculated using the following equation:

$$\text{Turning Point} = -\frac{\beta_1}{2\beta_2} = -\frac{-0.900480}{2(0.497666)} = \frac{0.900480}{0.995332} = 0.905$$

The estimated turning point of 0.905 indicates that the relationship between social disclosure and ROE changes from negative to positive once the Social disclosure score exceeds this threshold. Since the maximum observed Social disclosure score in the sample reaches 1.300, several companies have already surpassed the estimated turning point. If this pattern reflects a genuine underlying relationship, it would tentatively suggest that firms with relatively higher levels of social disclosure have begun to experience the long-term economic benefits of social responsibility initiatives. However, since the squared Social term is not statistically significant ($p = 0.1847$), this turning point should be regarded as descriptive of the estimated curve rather than as evidence of a confirmed structural break, and the overall linear regression also remains statistically insignificant because not all firms have achieved consistently high levels of social disclosure, resulting in an insignificant average effect across the sample. Taken together, these results indicate that the relationship between social disclosure and financial performance in this sample is, at most, weakly and tentatively nonlinear, and firmer conclusions would require a larger sample or a longer observation period.



Source: EVIEWS 14, (processed data)

Figure 3 Illustrates the quadratic relationship between social disclosure and ROE obtained from the nonlinear regression model

The curve initially slopes downward, indicating that increases in social disclosure are associated with higher implementation costs than immediate financial benefits. After the Social disclosure score exceeds the estimated turning point of 0.905, the curve gradually rises, suggesting that the long-term benefits of social responsibility begin to outweigh the initial implementation costs. This pattern is directionally consistent with the estimated nonlinear regression coefficients; however, since the squared term is not statistically significant, the curve should be read as an illustrative, tentative depiction of the estimated relationship rather than confirmation that companies with higher levels of social disclosure reliably experience improved financial performance over time.

These findings are consistent with Shan et al., (2025), who argue that the financial benefits of social responsibility are generally realized over the long-term rather than immediately reflected in profitability. Similarly, Korankye et al. (2025) suggest that social initiatives strengthen stakeholder trust and corporate sustainability, although their financial impact may only emerge after sustained implementation. In contrast, Ozata Canli and Sercemeli, (2025) reported a positive relationship between social disclosure and financial performance. The difference may be attributed to the characteristics of the Indonesian nickel mining industry, where firms continue to incur substantial social investment costs while the expected economic benefits have not yet been fully realized.

The Impact of Governance on Financial Performance

The regression results indicate that the Governance (G) variable has a positive and statistically significant effect on the financial performance of Indonesian nickel mining

companies, with a coefficient of 0.332101 and a probability value of 0.0500. Since the probability value meets the 5% significance level, **H4 is accepted**, indicating that greater governance disclosure contributes to higher Return on Equity (ROE). This finding suggests that companies with stronger governance practices are more likely to improve their financial performance through enhanced transparency, accountability, and effective corporate oversight.

According to Agency Theory, good corporate governance reduces agency conflicts between managers and shareholders by strengthening monitoring mechanisms, improving transparency, and minimizing information asymmetry. These governance practices increase investor confidence and support more effective managerial decision-making, which ultimately contributes to better financial performance. Furthermore, Stakeholder Theory suggests that effective governance enhances corporate credibility and accountability, thereby strengthening stakeholder trust and supporting sustainable business performance.

These findings are consistent with Korankye et al. (2025), who reported that strong governance practices improve corporate competitiveness and financial performance by increasing investor confidence and enhancing organizational efficiency. Similarly, Shan et al. (2025) argue that governance is an important component of ESG because it promotes better decision-making, strengthens internal control systems, and supports long-term corporate sustainability. However, the findings differ from Ozata Canli and Sercemeli, (2025), who found that governance disclosure did not significantly affect financial performance in the energy sector. This difference may be explained by the characteristics of the Indonesian nickel mining industry, where governance plays a more prominent role in maintaining regulatory compliance, improving transparency, and strengthening stakeholder confidence amid increasing environmental and social scrutiny. Consequently, stronger governance disclosure contributes positively to the financial performance of nickel mining companies.

Why Environmental and Governance Disclosures Improve Profitability while Social Disclosure Does Not

Beyond comparing these results with prior studies, it is important to explain why Environmental and Governance disclosures translate into higher profitability while Social disclosure does not, within the specific context of the nickel mining industry. First, the financial consequences of Environmental and Governance practices tend to be more direct, immediate, and quantifiable. Environmental disclosure in a capital-intensive, environmentally sensitive sector such as nickel mining is closely tied to compliance with emission and waste-management regulations, licensing requirements, and land-reclamation obligations; stronger disclosure in this area signals lower exposure to fines, operational disruptions, and reputational risk, all of which have a comparatively fast and traceable effect on earnings and, in turn, on ROE. Similarly, Governance disclosure operates through the agency-cost channel: better monitoring, transparency, and board oversight reduce information asymmetry between managers and shareholders, which lowers the perceived risk faced by investors and can improve the terms on which the firm accesses capital, an effect that is also reasonably quick to materialize. Second, Social disclosure differs in the nature of its investment and payoff structure. Expenditures on employee welfare, occupational health and safety, and community development represent relational investments whose returns such as reduced labor turnover, fewer community conflicts, and a stronger social license to operate accumulate gradually and are more diffuse, making them harder to detect within a relatively short panel covering 2021–2025. This reasoning is consistent with the tentative U-shaped pattern identified in the nonlinear analysis above, where early-stage social investments appear to weigh on profitability before any longer-term benefits can emerge. Taken together, these mechanisms suggest that Environmental and Governance disclosures create value for shareholders mainly by reducing measurable operational and agency risks, whereas the financial payoff of Social disclosure is more contingent on sustained, longer-term implementation, which explains the differing statistical results across the three ESG dimensions in this study.

5. Conclusion

This study examined the effect of Environmental, Social, and Governance (ESG) disclosure on the financial performance of Indonesian nickel mining companies during the 2021–2025 period using panel data regression estimated through the Panel EGLS method with cross-section weights. The findings reveal that overall ESG disclosure does not have a significant effect on Return on Equity (ROE), indicating that aggregate ESG disclosure has

not yet become a key determinant of corporate profitability. However, when ESG is analyzed separately, the Environmental (E) dimension has a positive and significant effect on ROE, suggesting that stronger environmental disclosure contributes to improved financial performance. In contrast, the Social (S) dimension has a negative but insignificant effect on ROE. The additional nonlinear analysis points to a tentative, not statistically significant U-shaped pattern ($S^2 p = 0.1847$), which, if confirmed by future research with a larger sample, would imply that the financial benefits of social disclosure emerge only after companies reach a higher level of social disclosure. Meanwhile, the Governance (G) dimension has a positive and significant effect on ROE, indicating that stronger governance practices contribute to better financial performance.

These findings imply that not all ESG dimensions influence corporate profitability in the same manner. Environmental and governance disclosures appear to create greater value for shareholders, whereas the benefits of social disclosure require a longer implementation period before generating measurable financial returns. Therefore, companies should strengthen environmental management and corporate governance while improving the effectiveness of social initiatives to maximize their long-term economic benefits. For investors, the results suggest that evaluating ESG dimensions individually provides more meaningful information than relying solely on an aggregate ESG score when assessing corporate financial performance.

This study is limited by its focus on nickel mining companies listed on the Indonesia Stock Exchange and by the relatively short observation period. Furthermore, ESG disclosure was measured using a disclosure index, which reflects the extent of disclosure rather than the actual quality of ESG implementation. Future studies are encouraged to extend the observation period, include other industrial sectors, and incorporate additional firm-specific and macroeconomic variables, such as nickel prices, production volume, or ESG performance ratings, to provide a more comprehensive understanding of the relationship between ESG practices and corporate financial performance.

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