

Linking Environmental Disclosure, Environmental Performance, and Gender Diversity in Indonesian Coal Companies

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ABSTRACT

Purpose – This study aims to examine the effect of environmental disclosure, environmental performance, and gender diversity in the board of directors on the financial performance of coal companies in Indonesia.

Design/methodology/approach – This study uses panel data from 66 firm-year observations representing 22 listed coal companies over the 2021-2023 period. Environmental disclosure is measured using relevant environmental indicators derived from the GRI G4 framework, environmental performance is measured using the Indonesia PROPER rating, gender diversity is measured based on female representation in the relevant corporate governance body, and financial performance is proxied by return on equity. Panel regression analysis is employed to examine the proposed relationship.

Finding/Results – The findings indicate that environmental disclosure is positively associated with financial performance, whereas environmental performance is negatively associated with financial performance. Gender diversity does not exhibit a statistically significant association with financial performance.

Originality/Value – The study contributes to the literature by distinguishing externally reported environmental information from internal environmental management accounting practices and by examining environmental disclosure, environmental performance, and gender representation simultaneously in the context of Indonesian listed coal companies. The study further highlights that environmental transparency and environmental performance may have different financial implication in the short and long term.

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1. Introduction

Rapid technological advancements in the era of Society 5.0 have made companies more competitive, including in the coal mining industry (Wang et al., 2025). To attract investors and maintain an edge in this highly competitive market, companies must improve their financial performance through strategic direction and a strong CEO's social media presence (Yadav et al., 2024). Since company performance is a primary consideration for investors when making investment decisions, this has become increasingly important (Meehan & Corbet, 2025). This is particularly true for the coal mining industry in Indonesia, which makes a significant economic contribution to the country. However, due to societal pressures for environmental awareness, strong financial performance is no longer sufficient (Almaqtari et al., 2024). The emergence of green investors, those who favor environmentally conscious companies, highlights the importance of corporate environmental responsibility as part of a positive corporate image (He & Yang, 2024). In this context, companies must prioritize sustainability through environmentally friendly operating procedures and a focus on profits (Christ & Burritt, 2013).

This study aims to examine the relationship between corporate environmental performance (Almaqtari et al., 2024; Voinea et al., 2020), environmental disclosure (Deb et al., 2023; Nguyen et al., 2025), and good corporate governance that considers gender diversity (Gao et al., 2024), and their impact on the financial performance of coal companies. According to this study, environmental disclosure refers to the provision of environmental information to external stakeholders through annual reports, sustainability reports or other corporate reporting channels (Badar Ul Munir & Ishfaq, 2025; Liem & Hien, 2024; Salim et al., 2023). Furthermore, by encouraging companies to include environmental costs in their financial statements, from an NRBV perspective, environmental disclosure represents an externally communicated form of environmental information that can support organizational transparency, stakeholder confidence, and the communication of environmental capabilities (Hart & Dowell, 2011). The branch of business law known as "green accounting" explicitly emphasizes business operations' environmental benefits and drawbacks. Frameworks such as the Global Reporting Initiative (GRI) provide structured guidance for organizations to communicate information concerning environmental impacts, resource use, emissions, waste, compliance, and related sustainability matters. The GRI G4 Index, a standard that enables companies to disclose the environmental impact of their operations, is the metric used to measure environmental impact (Latifah & Soewarno, 2023).

Beyond environmental impact, one of the key elements that influences a company's financial performance is its environmental performance (Almaqtari et al., 2024). The Indonesian Ministry of Environment ranks companies according to how well they manage the environmental impact of their operations through the Program for Evaluation of Corporate Performance in Environmental Management (PROPER). PROPER provides investors with an overview of a company's commitment to sustainability and helps companies raise awareness of their environmental responsibilities (Toukabri & Alwadai, 2024). According to stakeholder theory, companies have obligations to all stakeholders, including the environment (Weng et al., 2015). One of the most reliable ways to inform investors that a company is performing well financially is by using PROPER to evaluate its environmental performance (Almaqtari et al., 2024; Tan et al., 2022).

The theories applied in this study explain the conflict of interest between owners and agents: stakeholder theory and agency theory (Kren & Kerr, 1993). By recommending good

governance practices, agency theory helps reconcile conflicts of interest between company owners and managers (Elmassri et al., 2023). According to Asare et al. (2023), gender diversity is an important variable in corporate governance and one of the governance indicators used. One important tool that can increase leadership effectiveness and reduce the potential for bias in decision-making is gender diversity on the board of directors (Gao et al., 2024). Agency theory states that the presence of women on the board can help prevent managers from acting opportunistically and encourage companies to focus on sustainability (Elmassri et al., 2023). According to several studies, women are more likely to be concerned about environmental issues and corporate social responsibility, which aligns with calls for companies to focus on sustainability in their operations. However, research findings on how gender diversity affects financial performance are mixed. Meanwhile, some studies have found no effect or even an adverse effect (Asare et al., 2023; Gao et al., 2024), while others have found that gender diversity can improve financial performance (Alahdal et al., 2024; Gaio et al., 2024). To better understand this, it is necessary to investigate the relationship between corporate financial performance and gender diversity on the board of directors. The results of these studies, which measure the impact of gender diversity, environmental performance, and environmental disclosure on corporate financial performance, are inconsistent. While some studies have found no significant effect (Ahmed et al., 2024), others have found that environmental management and environmental performance positively impact financial performance (Agustia et al., 2019; Voinea et al., 2020). The impact of gender diversity on financial performance also yields similar results, with some studies showing a positive relationship (Alahdal et al., 2024; Gaio et al., 2024; Mia et al., 2022) while others show the opposite (Asare et al., 2023). This gap highlights the need for further research to clarify this relationship, particularly for Indonesian coal companies operating in sectors with significant environmental impacts.

The primary objective of this study is to examine the impact of environmental disclosure, environmental performance, board governance, and gender diversity on the financial performance of coal companies in Indonesia. Furthermore, by considering gender diversity and good governance, this study aims to integrate variables that have not been widely explored simultaneously in previous studies, such as the impact of environmental disclosure and environmental performance on financial performance (Agustia et al., 2019; Alahdal et al., 2024; Rachmawati et al., 2020). By combining these variables, this study should fully understand the factors that influence the financial performance of Indonesian coal companies. This study's leading innovation and contribution is the uses of gender diversity as a component of corporate governance and the measurement of environmental disclosure using the GRI G4 indicators. Furthermore, assessing financial performance using the return on equity (ROE) ratio provides a more detailed view of how corporate governance, environmental performance, and environmental management impact corporate finance (Agustia et al., 2019; Alahdal et al., 2024; Deb et al., 2023; Gaio et al., 2024). The contribution of this research does not merely stem from the combination of three independent variables within a single regression model. Rather, it lies in the theoretical distinction between environmental transparency, environmental performance and governance characteristics, as well as in examining whether these dimensions exhibit different relationships with financial performance among listed coal companies in Indonesia. By integrating the Natural Resource-Based View, stakeholder theory and agency theory, this study provides a more coherent

explanation of why environmental information, environmental performance and corporate governance may have different financial implications.

This study is important not only for scientific advancement but also for business, especially in the coal mining industry, which is often in the news for its environmental impact (Wang et al., 2025). This research is expected to help companies and investors understand the importance of sustainability factors, such as environmental performance and risk management, in improving corporate financial performance (Dangelico et al., 2017). Companies can become more committed to environmental conservation and implement good governance practices, such as considering gender diversity in corporate leadership (Gaio et al., 2024; Mia et al., 2022). However, this study is also expected to encourage investors to examine financial ratios such as return on equity and consider a company's environmental performance and image, which are developed through ED (He & Yang, 2024). Therefore, sustainability considerations can be considered when making investment decisions, benefiting all stakeholders in the long run (Ahmed et al., 2024). This research is important in providing companies with an overview of the importance of maintaining a positive reputation as environmentally conscious, given the increasing demands from society and government regulations regarding sustainability (Afum et al., 2020; Baah et al., 2021). Investors may find such companies more attractive, especially those who prefer sustainable investing or focus on social value.

Overall, this study brings together several topics relevant to the contemporary business world, including gender diversity (Alahdal et al., 2024), good corporate governance (Elmassri et al., 2023), and environmental sustainability (Ahmed et al., 2024). These topics are important in creating a financially well-performing company with a good reputation (Baah et al., 2021; Yadav et al., 2024). This study's findings will significantly assist in developing sustainable business practices and provide policymakers with information on motivating companies to adopt better, more environmentally friendly governance.

2. Literature Review & Hypothesis Development

2.1. Literature Review

The Natural Resource-Based View (NRBV) emphasizes leveraging a firm's internal resources and capabilities to achieve sustainable competitive advantage through environmental performance. This theory is integrated with other strategic management frameworks to enhance its applicability and effectiveness. NRBV capabilities are identified and categorized using dynamic capabilities theory, which helps firms in the Scottish agri-food sector to apply these capabilities effectively (McDougall et al., 2016). A framework combining NRBV with sustainability dimensions supports organizations in aligning their resources and capabilities with sustainable strategies, enhancing value creation and appropriation (Negrão et al., 2024). Employee stakeholder integration, when combined with proactive environmental strategies and a shared vision, significantly improves environmental performance, demonstrating the practical application of NRBV (Alt et al., 2015).

Stakeholder theory focuses on the importance of managing relationships with various stakeholders to achieve organizational goals. This theory is often integrated with NRBV to address environmental and social responsibilities. Firms can translate stakeholder pressures into positive environmental outcomes by integrating green human resource management and fostering a green culture (Muafi et al., 2024). Effective stakeholder involvement processes in natural resource management (NRM) are characterized by the use of scientific information, genuine influence on decisions, fair treatment, and informative communication (Chase et al.,

2004). Corporate governance mechanisms, such as board size and stakeholder engagement, play a crucial role in CSR reporting and reducing agency costs, aligning with stakeholder theory (Darus et al., 2013).

Agency theory deals with conflicts of interest between principals (owners) and agents (managers) and is often used to explain corporate governance and performance. In public hospitals, a combination of RBV and resource dependence theory (RDT) is used to understand strategic choices related to stakeholders and resources, highlighting the importance of recognizing and managing critical resources (Austen & Frączkiewicz-Wronka, 2018). The influence of corporate governance on sustainable economic performance is examined through agency theory, which emphasizes the role of board independence and stakeholder representation in enhancing ESG performance (Popov & Makeeva, 2022).

Integrating NRBV with stakeholder and agency theories provides a comprehensive approach to achieving environmental and organizational performance. For instance, NRBV's focus on internal capabilities can be enhanced by stakeholder engagement and effective governance mechanisms (Alt et al., 2015; Muafi et al., 2024; Negrão et al., 2024). This approach requires a strategic alignment of internal resources, stakeholder engagement, and effective governance practices. Managers need to develop competencies in strategic management to effectively configure and acquire resources, satisfy key stakeholders, and achieve competitive advantage (Austen & Frączkiewicz-Wronka, 2018). Organizations are encouraged to adopt proactive environmental strategies and engage stakeholders constructively to foster sustainable practices and improve overall performance (Alt et al., 2015; Chase et al., 2004).

Three major theories were used in this study. The resource-based perspective gave rise to the natural resource-based perspective (NRBV), which highlights the value of using environmentally friendly resources to gain a sustainable competitive advantage (Hart, 1995; Hart & Dowell, 2011). While environmental disclosure support improved financial performance through environmental cost savings, the environmental information of NRBV also encourages firms to include environmental costs in financial statements (González-Torres et al., 2020). Environmental performance measures such as PROPER further emphasize the stakeholder theory regarding a firm's obligations to all stakeholders, including social and environmental responsibilities. Firms' financial performance can be improved by attracting green investors through good environmental performance (He & Yang, 2024).

However, agency theory highlights the conflict of interest between the owner and the agent in business management. With the help of a capable and gender-diverse board, good corporate governance can reduce information asymmetries, improve agency functions, and improve financial performance (Hossain et al., 2024). To achieve optimal financial performance, these perspectives suggest that environmental disclosure, environmental performance, and gender diversity represent different but interconnected organizational mechanisms. NRBV explains the strategic value of environmental capabilities and information; stakeholder theory explains the external consequences of environmental transparency and environmental performance; and agency theory explains how governance characteristics may affect monitoring and decision-making (Jiao et al., 2023; Liem & Hien, 2024). Accordingly, the present study examines environmental disclosure as an externally observable information mechanism.

The three perspectives are therefore complementary rather than mutually exclusive. NRBV provides the strategic logic for understanding why environmental information and environmental capabilities may create economic value; stakeholder theory explains how environmental transparency and environmental performance shape relationships with

external stakeholders; and agency theory explains how board characteristics may influence monitoring and managerial decision-making. Together, these perspectives allow the study to examine financial performance as the outcome of environmental information, environmental performance, and governance mechanisms operating through different organizational channels.

2.2. Hypothesis Development

Environmental disclosure can enhance transparency in a firm's environmental activities and reduce information asymmetry between managers and external stakeholders. From a stakeholder perspective, transparent environmental reporting may strengthen stakeholder confidence, corporate legitimacy, and organizational reputation. Investors may also use environmental information when assessing environmental risks, regulatory exposure, and the long-term sustainability of the firm.

According to the NRBV, the environment is a strategic asset and a cost that, with proper management, can reduce operating costs in the long run, particularly those related to mitigating environmental impacts. Companies can more quantitatively assess environmental impacts and manage natural resources with the help of environmental disclosure, which integrates environmental costs into the accounting system (Deb et al., 2023; Nguyen et al., 2025). By reducing costs and managing environmental risks, companies can improve their operational effectiveness and profitability, improving financial performance (Agustia et al., 2019; Deb et al., 2023). Therefore, the following theories can be proposed using the NRBV perspective.

H₁: Environmental disclosure positively affects the company's financial performance.

According to stakeholder theory, companies must meet the demands and expectations of various stakeholders, such as governments, investors, and society, regarding how their operations impact the environment. A company's reputation among stakeholders is enhanced by demonstrating a strong commitment to sustainability and social responsibility through good environmental performance (Agustia et al., 2019; Yadav et al., 2024). Investors who are more concerned about the environmental aspects of green investments, and who view companies with strong environmental performance as more sustainable and less risky investments, may be attracted to positive ratings from programs such as PROPER, which provide ratings based on environmental management (He & Yang, 2024). This investor support can result in better financial performance by expanding a company's capital and stabilizing its stock value (Rachmawati et al., 2020; Voinea et al., 2020). Therefore, the following theories can be proposed by stakeholder theory.

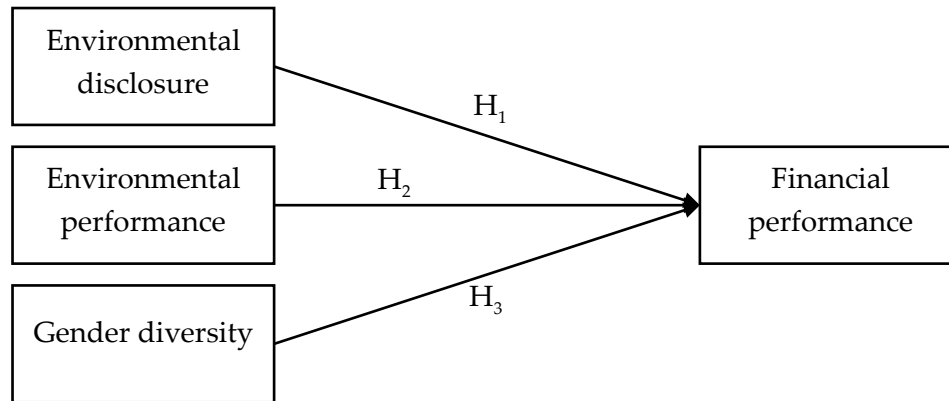
H₂: Good environmental performance affects the company's financial performance.

According to agency theory, conflicts of interest between management (agents) and owners (managers) often arise due to differing goals, with agents often acting in ways that conflict with the owners' goals (Elmassri et al., 2023; Kren & Kerr, 1993). Since having multiple perspectives from members with different backgrounds and genders enhances internal control mechanisms, gender diversity on the board can mitigate this conflict (Gaio et al., 2024). For example, corporate governance practices can be improved by the perspectives that female directors often bring to decision-making. This perspective emphasizes sustainability, social responsibility, and transparency (Alahdal et al., 2024; De Masi et al., 2022; Mia et al., 2022). Accountability and the quality of board decision-making are believed to increase with greater gender diversity, leading to improved operational effectiveness and enhanced financial

performance (Mia et al., 2022). Therefore, the following theories can be proposed using agency theory.

H₃: Firms' financial performance is affected by gender diversity on the board of directors.

Figure 1. Research Design



Source: authors' elaboration

Based on the integrated theoretical framework, the research model examines three distinct explanatory dimensions of financial performance: environmental disclosure, environmental performance, and gender diversity. Environmental disclosure captures the extent of environmental information communicated externally; environmental performance captures the firm's environmental rating under the Indonesian PROPER program; and gender diversity captures female representation within the corporate governance body examined in this study.

3. Methodology

The impact of gender diversity, environmental performance, and environmental disclosure on the financial performance of coal companies listed on the Indonesia Stock Exchange during the period 2021–2023 was examined in this study using quantitative methods with a panel data analysis approach (Sugiyono, 2013; Toukabri & Alwadai, 2024). The secondary data used were collected from the annual reports of relevant companies and the official website of the Indonesia Stock Exchange (Neuman, 2013). For a more comprehensive analysis, this study uses a panel method to combine cross-sectional and time-series data (Tian et al., 2023). A total of 22 companies were selected as the sample because the data used for this study met the requirements for valid values and complete financial reports during the study period to ensure consistency.

Environmental disclosure is measured using relevant environmental indicators derived from the GRI G4 framework, which totals 91 indicators with a maximum value of 1 (100%) if all indicators are met and 0 (0%) if none are met. As for environmental performance, the PROPER rating is used where 5 is for gold, 4 is for green, 3 is for blue, 2 is for red, and 1 is for black. The lower the value, the worse the PROPER rating. Then, finally, gender diversity is measured based on the representation of women within the corporate governance body examined in the study (Female Representation = Number of Female Members / Total Number of Members).

Table 1. Research data

Year	Total firm-years	PROPER available	Missing
2021	22	22	0

2022	22	22	0
2023	22	22	0

Source: Authors' elaboration

The data analysis process includes classical assumption testing stages for normality, multicollinearity, autocorrelation, and variance asymmetry required for a regression model to meet eligibility requirements. Furthermore, three panel data regression models—common effects (CEM), fixed effects (FEM), and random effects (REM)—were used in this study. To determine the most appropriate model, the Chow test was used to select between CEM and FEM; the Hausman test was used to compare FEM and REM; and the Lagrange multiplier test was used to determine whether REM was superior to CEM (Lin et al., 2021).

This study used the F test to determine the effect of independent variables on financial performance and the t test to test the individual effect of each independent variable on the dependent variable to test the hypothesis. To determine the model's ability to account for variation in financial performance, the coefficient of determination (R^2) was also calculated (Neuman, 2013). Using this approach, this study hopes to collect accurate and reliable empirical data to answer the hypotheses on the impact of gender diversity, environmental performance, good corporate governance, and asset management practices on financial performance.

4. Results and Discussion

From 2021 to 2023, the mining industry's financial performance, as measured by return on equity, ranged from 1.219 to a minimum of -2.549. The highest and lowest values for environmental disclosure were 0.549 and 0.407, respectively. The lowest value for the proxy for environmental performance, PROPER, was one, and the highest was 5. Additionally, the average value for gender diversity was 5.288, with two being the lowest and 11 the highest.

Table 2. Descriptive Statistical Analysis

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Financial performance	66	-2.549	1.219	0.195	0.462
Environmental disclosure	66	0.407	0.549	0.501	0.026
Environmental performance	66	1	5	2.879	1.584
Gender diversity	66	0.182	0.667	0.424	0.150

Source: Authors' elaboration

ROE measures how effectively a company uses money or shareholders' equity to generate profit. A positive ROE of 1.219 indicates a slight profit return generated by the company. A negative ROE of -2.549 indicates a significant loss; the company lost more than twice its shareholders' equity. It showed a volatile and unstable financial performance in this sector.

Environmental disclosure in the mining industry was relatively moderate with the proportion of fulfilled GRI G4 ranging from 40,7% to 54,9% of the 91-item assessment checklist. No company fully complied with all GRI G4 criteria. Even the best scorer (0.549) didn't reach two-thirds compliance. The relatively low disclosure scores indicate that the sampled firms did not disclose all assessed environmental information items. This finding reflects the extent of external environmental transparency and should not be interpreted as evidence of the extent of firms' internal environmental management accounting practices.

PROPER is an Indonesian government program rating companies from black (1), the worst environmental performance, to gold (5), the best environmental performance. There is a broad

spectrum in environmental performance in the mining sector. Some companies are categorized as very poor in environmental performance, while others excel. Although mining companies usually emit pollution, there are also mining companies that get gold in PROPER. Gender diversity ranges from 0.182 to 0.667, with an average of 0.424, indicating that female representation varies considerably across the sampled firms.

According to the Chow and Hausman test, the fixed effects model is the most appropriate for this study. Multiple linear regression analysis can be performed because the data, the final sample consists of 22 listed coal companies observed over three years, producing 66 firm-year observations, are usually distributed in the regression model, as shown by a Jarque-Bera probability value of >0.050 ($0.063 > 0.050$). Table 3 presents these results.

Table 3. Normality Test Result

N	66
Jarque-Bera	0.135
Probability	0.063

Source: Authors' elaboration

Multicollinearity can then be confirmed using the variance inflation factor (VIF). If the VIF value is greater than 10, multicollinearity is present; if it is less than 10, the opposite occurs. Table 4 demonstrates the absence of multicollinearity where the VIF value of the multicollinearity statistic is less than 10. Furthermore, the table indicates that all independent variables have significance values above 5%, suggesting that the regression model does not suffer from heteroscedasticity. Thus, given the panel structure of the data, inference is based on heteroskedasticity-robust standard errors clustered at the firm level. Firm fixed effects are included to control for time-invariant firm characteristics, while year fixed effects are included to account for shocks common to firms in a given year.

Table 4. Multicollinearity and Heteroscedasticity Test Results

Variable	Collinearity Statistics		Glejser Test	
	Tolerance	VIF	t	Sig.
Environmental disclosure	0.885	1.130	1.137	0.259
Environmental performance	0.846	1.183	0.036	0.971
Gender diversity	0.786	1.132	0.163	0.192

Source: Authors' elaboration

The results of the multiple linear regression analysis are presented in Table 5. The model includes three independent variables (Environmental disclosure, environmental performance, and gender diversity). The regression equation based on the coefficients can be written as:

$$FP = -7.691 + 17.817ED - 0.333EP - 0.222GD + \varepsilon \quad (1)$$

Table 5. Firm and Year Fixed-Effects Regression Analysis Results

Variable	Coef.	t-statistics	Prob.	Decision
Constant	-7.691	-2.288	0.0275	-
Environmental disclosure	17.817	2.707	0.0099	Significant
Environmental performance	-0.333	-2.694	0.0087	Significant
Gender diversity	-0.222	-0.906	0.6688	Not significant
R-square				0.671
Adjust r-square				0.466
F-statistics				3.267

Variable	Coef.	t-statistics	Prob.	Decision
Prob (f-statistics)				0.000
α				5%
N				66
Firms				22
Years				3

Source: Authors' elaboration

The coefficient for environmental disclosure is 17.817 with a t-statistic of 2.707 and p-value of 0.0099, which is less than a 5% significance level. Therefore, this study's first hypothesis (H_1) can be accepted, as environmental disclosure has a significant impact on financial performance. According to the NRBV theory, companies can improve their operational efficiency and profitability by reducing costs and managing environmental risks, leading to improved financial performance.

The results of this study are consistent with the research of Agustia et al. (2019), which found that environmentally conscious companies can improve their financial performance and that companies can continue to survive (be sustainable) if they can adjust their business operations to the rules or standards that apply in society. Research by Deb et al. (2023) confirmed the same finding, showing that financial performance increases with greater environmental disclosure. However, this differs from the findings of Almaqtari et al. (2024), who indicated no relationship between environmental disclosure and a company's financial performance. This is because it is not yet certain whether a company's social legitimacy can be improved by implementing a good management assessment, which can impact improved financial performance.

Environmental performance, with a coefficient of -0.333, a t-statistic of -2.694, and a p-value of 0.008. The p-value is less than 5%, indicating the second hypothesis of this study (H_2) can be accepted, as environmental performance has a significant negative impact on financial performance. According to stakeholder theory, programs such as PROPER, which provide ratings based on environmental management, can attract investors who prioritize environmental issues. Green investors view companies that perform well in terms of the environment as less risky and more sustainable investments. This investor support can lead to better financial performance by expanding a company's available capital and stabilizing its stock value.

The results of this study support the finding of Voinea et al. (2020), which found that a company's environmental spending increases with its environmental performance. This contrasts with research by Rachmawati et al. (2020), which found that environmental performance positively impacts financial performance, potentially leading to lower financial performance. Several studies indicate that there can be a negative impact of environmental performance on financial performance under certain conditions. Environmental performance negatively affects financial performance in the short term (one-year lag). However, this effect can turn positive in the long term (two-year lag), supporting the Porter hypothesis that environmental investments may yield financial benefits over time (Horváthová, 2012). In heavy-pollution industries, environmental performance has a significantly negative impact on financial performance, particularly on market-based indicators like Tobin's Q (Chang, 2015). This suggests that the costs associated with environmental compliance can outweigh the benefits in these sectors.

According to this study, implementing excellent environmental performance can impact a company's financial performance. Environmental performance assessments conducted through PROPER ratings impact the environmental costs a company must pay. Environmental performance may involve short-term compliance expenditures or environmental investments that place pressure on contemporaneous profitability. However, the present study does not directly measure environmental expenditure or compliance costs, and therefore cannot establish this mechanism empirically. Reverse causality and omitted firm characteristics may also contribute to the observed association. For example, firms facing greater environmental exposure or regulatory scrutiny may simultaneously invest more in environmental management and experience weaker profitability.

Furthermore, gender diversity shows a coefficient of -0.222 with a t-statistic of -0.906 and a p-value of 0.6688 or above 5%. This indicates that the third hypothesis of the study (H_3) is rejected, as gender diversity has no significant impact on financial performance. The non-significant coefficient indicates that female representation, as measured in this study, is not statistically associated with ROE among the sampled listed coal companies during 2021–2023. This contradicts agency theory. Board accountability and decision-making quality cannot be improved through gender diversity, which will not improve operational effectiveness or financial performance. The results of this study support the findings of Asare et al. (2023), who found that the presence of female directors on the board has no impact on financial performance. However, without considering environmental sustainability, female managers can improve financial performance, as Mia et al. (2022) point out. Furthermore, gender diversity hurts financial performance, according to De Masi et al. (2022).

The model's overall performance is evaluated through the R^2 and Adjusted R^2 values. The R^2 value of 0.671 indicates that approximately 67.1% of financial performance in the mining sector can be explained by environmental disclosure, environmental performance, and gender diversity. The Adjusted R^2 value of 0.466, which accounts for the number of predictors in the model, also reflects a moderate explanatory power. The F-statistic value of 3.267 and its associated significance level (p-value = 0.000) demonstrate that the regression model is statistically significant overall. This confirms that, jointly, the independent variables significantly explain the variance in the dependent variable.

5. Conclusion and Suggestion

This study examines the association of environmental disclosure, environmental performance, and board gender diversity with financial performance among listed coal companies in Indonesia. Using panel data from 22 companies observed over three years and firm and year fixed-effects estimation, the findings indicate that the three explanatory variables exhibit different relationships with financial performance.

First, environmental disclosure is positively and significantly associated with financial performance. This finding suggests that greater transparency in externally reported environmental information may be associated with improved financial outcomes, potentially through greater stakeholder confidence, reduced information asymmetry, and enhanced corporate legitimacy.

Second, environmental performance is negatively and significantly associated with financial performance in the estimated model. This result is consistent with the possibility that environmental management and compliance activities may impose short-term financial costs in environmentally intensive industries. However, because environmental expenditure is not

directly measured, this interpretation should be considered a possible explanation rather than a confirmed causal mechanism.

Third, board gender diversity does not exhibit a statistically significant association with financial performance. This finding does not imply that female representation is ineffective in improving governance or decision-making. Rather, the result indicates that, within the observed sample and measurement approach, the financial-performance association of board gender diversity is not statistically distinguishable from zero.

From a theoretical perspective, the findings provide empirical evidence that is consistent with different mechanisms proposed by NRBV, stakeholder theory, and agency theory, but they do not constitute direct confirmation or rejection of these theories. The contribution of the study therefore lies in demonstrating that environmental transparency, environmental performance, and board gender diversity may have distinct financial implications in Indonesian listed coal companies.

6. Limitations and Future Research

This study has several limitations that should be considered when interpreting the results. First, the research is limited to the listed coal companies in Indonesia, which restricts the generalizability of the findings to other industrial sectors. The relatively small sample size further reduces the statistical power and may influence the stability of the estimated relationships.

Second, the measurement of environmental performance relies on the GRI G4 Index, which is not uniformly adopted across all companies. This inconsistency may introduce measurement bias and affect the validity of the conclusions. Third, although the study employs firm and year fixed-effects estimation, the relatively short three-year observation period limits the ability to capture longer-term financial effects of environmental practices. The short panel may also limit the statistical power to identify within-firm changes in environmental disclosure, environmental performance, and board gender diversity.

These limitations are primarily related to data constraints, measurement issues, and methodological choices rather than fundamental theoretical errors. However, they may still influence the robustness and external validity of the findings.

For future research, several directions are proposed. Researchers should consider expanding the sample to include multiple sectors and larger datasets to improve generalizability. Employ longer panel periods to examine whether the financial implications of environmental performance change over time. Researchers may also incorporate environmental expenditure, environmental investment, environmental management accounting practices, and lagged financial outcomes to investigate the mechanisms underlying the observed relationships.

Additionally, future studies may incorporate additional variables such as Environmental Information Systems (EIS), Green Supply Chain Management (GSCM), and more comprehensive measures of corporate financial performance (Deb et al., 2023; Yu et al., 2020). By doing so, researchers can develop a more holistic understanding of how environmental practices influence firm performance across different contexts.

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used DeepL in order to translate the manuscript from Indonesian into English. After using this tool, the authors carefully reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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