The Effect of CSR Departments, Leverage, and Good Corporate Governance on Carbon Emission Disclosure

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ABSTRACT

Indonesia is rich in natural resources that support national development but also contribute to increasing carbon emissions from energy and mining activities. This study examines the impact of the presence of a corporate social responsibility department, financial leverage, and principled corporate governance on carbon emission disclosure in energy and mining sector companies listed on the Indonesia Stock Exchange from 2019 to 2023. Adopting a positivist orientation with a panel data regression encompassing twelve entities across a quinquennial term, thereby yielding sixty discrete observations, the investigation employs the GRI version four index, the debt-to-equity quotient, and the magnitude of the board as analytic stand-ins. The outcomes illustrate that the institutional presence of CSR departments exerts a materially affirmative influence on the transparency of carbon emission disclosures, while leverage and the extent of board membership do not present statistically consequential effects. The three variables collectively explain 13.2% of the variation in disclosure, with CSR departments emerging as the dominant factor. These results underscore the pivotal role of sustainability-oriented organizational structures over financial or governance mechanisms in advancing environmental transparency amid global climate commitments.

Keywords*: Carbon Emission Disclosure, Corporate Social Responsibility, Good Corporate Governance, Leverage.*

INTRODUCTION

Indonesia has abundant natural resources such as forests, oceans, oil, gas, and coal that support national development and public welfare. However, companies operating in these sectors also carry significant responsibility for environmental impacts, particularly carbon emissions. Carbon emissions, resulting from both natural processes and human activities, are a key driver of global climate imbalance. The extensive use of fossil fuels in energy and transportation increases greenhouse gas concentrations and worsens environmental conditions (Kemala & Arum, 2023; Felisia et al., 2024). From a long-term perspective, strong carbon emission performance enhances corporate legitimacy and supports sustainable access to essential resources, which is important for business continuity (Liu et al., 2023). As one of the world's major emitters, Indonesia faces growing pressure to improve corporate responsibility in reducing environmental impacts and strengthening carbon emission governance (Nasih et al., 2019).

Indonesia remains heavily dependent on fossil energy, with primary energy production in 2022 rising by 7.7%, dominated by coal at 17,267,940 terajoules, followed by natural gas and crude oil (Oktaviani et al., 2024). This dependence is also evident in electricity generation, where coal-fired plants contribute 66.4% of total output, highlighting the country's significant reliance on fossil fuels that drive carbon emissions. Therefore, companies are expected to adopt environmentally responsible strategies, conduct impact assessments, and implement emission reduction technologies. Moreover, international

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frameworks such as the Paris Agreement 2015, Kyoto Protocol, and national regulations including Law Number 40 of 2007 and OJK Regulation Number 30/SEOJK.04/2016 reinforce corporate responsibility in environmental reporting and carbon emission disclosure (Freedman & Jaggi, 2005; Ngatimin et al., 2023).

However, the implementation of carbon emission disclosure in Indonesia's energy and mining sectors remains inconsistent. Stakeholder theory emphasizes that firms are obligated to meet stakeholder expectations through transparent environmental reporting, especially given the high emissions generated from fossil-based industrial activities (Rangga & Kristanto, 2023; Putri & Arieftiara, 2023). In practice, issues such as greenwashing and incomplete disclosures are still evident, as seen in PT Alamtri Resources Indonesia Tbk, which, despite claiming net-zero commitments, continues to rely heavily on coal and shows limited transparency in emissions reporting (Trendasia, 2021; Dermawan, 2025). Similar inconsistencies appear in PT Darma Henwa, which only began consistent reporting after 2020, while PT Bukit Asam demonstrates more comprehensive and continuous carbon emission disclosures since 2019. These conditions indicate a clear gap between regulatory expectations, corporate commitments, and actual reporting practices in Indonesia.

Ultimately, several factors influence corporate carbon disclosure practices, including the role of Corporate Social Responsibility (CSR) departments, leverage, and Good Corporate Governance (GCG) (Desai, 2022). CSR departments' effects on disclosure of a company's carbon emissions play a crucial role, as emissions reduction is part of a company's social responsibility (Maharani & Dewi, 2024). Using the GRI-4 index, CSR department performance enhances accountability in emissions reporting. Research has shown that reporting done by the CSR department positively impacts emissions disclosure (Purnayudha & Hadiprajitno, 2022; Bahriansyah & Ginting, 2022). Kholmi et al. (2020) argue that CSR report efforts often prioritize social empowerment over environmental management.

Leverage, proxied by the Debt-to-Equity Ratio (DER), represents a firm's capital structure and financial dependence on creditors. Companies with higher leverage are often expected to provide more transparent carbon emissions disclosure due to increased monitoring pressure from creditors and the need to maintain investor trust and corporate credibility, including in environmental performance (Sukmawati & Henny, 2024; Claudia & Halik, 2024). However, Putri and Hermi (2024) show contrasting evidence shows that leverage does not always significantly influence carbon emissions disclosure. Similarly, GCG, particularly through the board of directors, is expected to enhance transparency and accountability in environmental reporting. Active and responsible boards are associated with higher levels of carbon disclosure, as sustainability is viewed as part of corporate responsibility (Sari et al., 2021; Maudina, 2023). Nevertheless, Pramuditya and Budiasih (2024) argue that governance effectiveness does not always guarantee consistent disclosure, as environmental reporting may still be deprioritized despite board oversight.

CSR reporting done by CSR departments is expected to enhance transparency in reporting environmental impacts. Leverage may motivate companies to maintain stakeholder trust through emission disclosure. Meanwhile, GCG is anticipated to improve sustainability reporting quality. Despite previous studies showing inconsistent findings, this research contributes novelty by analyzing these variables in energy and mining companies listed on the IDX from 2019 to 2023. This study aims to examine the influence of CSR departments, leverage, and GCG on carbon emissions disclosure in Indonesia's mining sector.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Simultaneous Effect on Carbon Emission Disclosure

Carbon Emission Disclosure (CED) is influenced by multiple organizational factors that collectively strengthen corporate transparency and environmental accountability. The CSR department, leverage, and Good Corporate Governance (GCG) represent complementary mechanisms that shape a company's commitment to sustainability reporting. A dedicated CSR department facilitates the implementation of environmental initiatives and stakeholder engagement, while leverage increases pressure from creditors and investors for greater transparency regarding environmental performance (Román et al., 2021; Meiryani et al., 2023). At the same time, effective corporate governance, particularly through an active board of directors and supporting governance structures, provides strategic oversight that integrates sustainability objectives into corporate decision-making (Rangkuti et al., 2025). Together, these mechanisms reinforce corporate legitimacy, improve accountability, and encourage more comprehensive carbon emission disclosure.

Previous empirical studies provide evidence supporting the combined role of governance, financial, and sustainability factors in enhancing carbon emission disclosure. Román et al. (2021) found that companies with stronger sustainability profiles, including CSR committees, governance mechanisms, and favorable corporate characteristics, were significantly more likely to disclose carbon emissions. Likewise, Yulianti and Waworuntu (2025) reported that firms with sound financial performance and governance structures demonstrated greater transparency in carbon reporting. In addition, Choi et al. (2013) showed that governance quality, environmental committees, and board characteristics positively influenced the adoption of carbon management strategies and voluntary carbon disclosure. Collectively, these findings suggest that CSR governance, leverage, and corporate governance complement one another in promoting transparent carbon emission disclosure, forming the basis for the hypothesis that these variables simultaneously exert a positive and significant effect on carbon emission disclosure.

H1: The CSR department, leverage, and good corporate governance have a simultaneous positive and significant effect on carbon emission disclosure.

The Effect of CSR Department on Carbon Emission Disclosure

Corporate Social Responsibility (CSR) committees play a strategic role in integrating environmental and social objectives into corporate governance. By overseeing CSR initiatives, these committees help align sustainability practices with long-term business strategies while strengthening corporate accountability to a broad range of stakeholders. CSR disclosure extends beyond financial reporting by communicating a company's environmental and social commitments, thereby improving transparency and stakeholder confidence (Román et al., 2021). Effective CSR governance also enhances environmental accountability, encourages sustainable business practices, and supports initiatives aimed at reducing carbon emissions (Saeed et al., 2021; Farhan et al., 2025). Moreover, comprehensive CSR disclosure provides investors with valuable information regarding a firm's environmental performance, and companies with stronger CSR practices are generally more willing to disclose carbon emission information (Andrian, 2020).

Previous empirical studies consistently report a positive relationship between CSR governance and carbon emission disclosure. Purnayudha and Hadiprajitno (2022) and Bahriansyah and Ginting (2022) found that companies with well-established CSR departments tend to disclose carbon emissions more comprehensively, reflecting stronger commitments to environmental responsibility. Likewise, Román et al. (2021) demonstrated that firms with robust sustainability profiles, including sustainability reporting, external assurance, and dedicated CSR committees, are significantly more likely to disclose total carbon emissions. Their findings further suggest that complementary governance characteristics, such as gender diversity policies and larger firm size, reinforce environmental transparency.

H2: The CSR department has a positive and significant effect on carbon emission disclosure.

The Effect of Leverage on Carbon Emission Disclosure

Leverage, commonly measured by the Debt-to-Equity Ratio (DER), reflects a company's capital structure by indicating the proportion of debt used to finance its assets. A higher leverage ratio signifies greater reliance on external financing, making corporate decisions more dependent on obligations to creditors and other stakeholders (Meiryani et al., 2023). From the perspective of stakeholder and legitimacy theories, companies with high leverage are expected to provide more comprehensive environmental disclosures to maintain credibility, reduce information asymmetry, and strengthen investor confidence. Carbon emission disclosure serves as a signal of corporate accountability, demonstrating that the company manages environmental risks responsibly while fulfilling its financial commitments. Consequently, highly leveraged firms are generally considered more responsive to stakeholder expectations regarding sustainability reporting (Sukmawati & Henny, 2024; Claudia & Halik, 2024).

Empirical evidence generally supports the positive association between leverage and carbon emission disclosure. Meiryani et al. (2023) found that leverage significantly influences carbon emission disclosure, arguing that firms with higher debt levels are more likely to disclose environmental information to mitigate concerns over potential wealth transfers from creditors to shareholders and managers. Similarly, Yulianti and Waworuntu (2025) reported that companies with stronger financial performance and governance structures tend to provide more transparent carbon emission disclosures. According to their findings, greater disclosure helps preserve stakeholder trust, enhances corporate reputation, and attracts socially responsible investors, indicating that financial pressure and accountability can motivate firms to strengthen environmental transparency.

H3: Leverage has a positive and significant effect on carbon emission disclosure.

The Effect of Good Corporate Governance on Carbon Emission Disclosure

Good Corporate Governance (GCG) emphasizes transparency, accountability, and responsibility in protecting stakeholders' interests. Within this framework, the board of directors plays a pivotal role in determining corporate strategies, including policies related to environmental sustainability and carbon emission disclosure. Through effective oversight and decision-making, the board can encourage companies to adopt more transparent environmental reporting practices (Kılıç & Kuzey, 2018; Almuaromah & Wahyono, 2022). Governance mechanisms, such as independent boards, audit committees, and environmental committees, also function as internal control systems that strengthen accountability and support sustainability-oriented decision-making (Rangkuti et al., 2025). Strong governance structures enable companies to integrate environmental considerations into business strategies, while larger and more diverse boards may provide broader perspectives and improve the quality of sustainability-related decisions.

Previous studies have consistently demonstrated the importance of corporate governance in enhancing carbon emission disclosure. Choi et al. (2013) found that firms with higher governance quality were more likely to provide voluntary carbon emission disclosures, while environmental management systems, environmental committees, board size, and board independence significantly encouraged the adoption of carbon management strategies. Similarly, Sari et al. (2021) and Maudina (2023) reported that active and responsible boards tend to promote greater transparency in carbon reporting, as they perceive environmental disclosure as part of corporate responsibility. In addition, Bedi and Singh (2024) identified a positive relationship between board activity, environmental committees, and carbon emission disclosure. Likewise, Kılıç and Kuzey (2018) concluded that board nationality diversity and the presence of sustainability committees significantly strengthen corporate carbon emission policies and disclosure practices.

H4: Good corporate governance has a positive and significant effect on carbon emission disclosure.

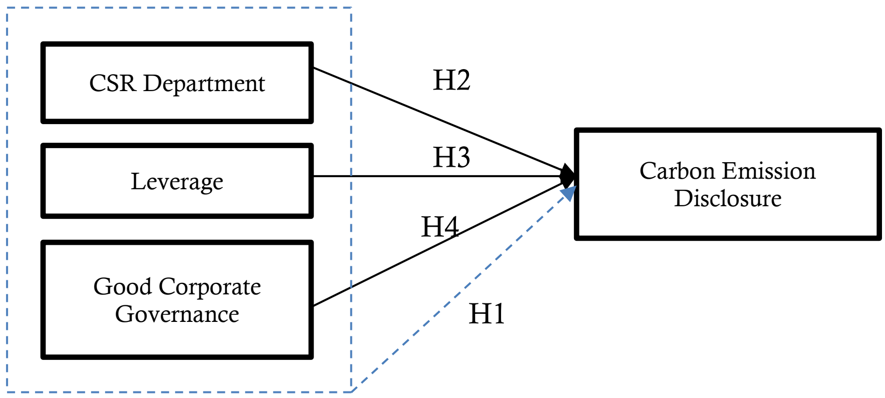

Figure 1. Research Framework

Figure 1 presents the proposed research framework illustrating the relationships among the study variables. Carbon emission disclosure is positioned as the dependent variable, while CSR department, leverage, and good corporate governance serve as the independent variables. The framework proposes four hypotheses: H2 examines the effect of the CSR department on carbon emission disclosure, H3 investigates the influence of leverage, H4 assesses the impact of good corporate governance, and H1 represents the simultaneous effect of all independent variables on carbon emission disclosure. This conceptual framework provides the basis for empirically testing the direct relationships between the proposed determinants and carbon emission disclosure.

RESEARCH METHODS

This study employs a quantitative, deductive approach to examine the influence of the CSR department, leverage, and good corporate governance on carbon emission Disclosure among mining companies listed on the Indonesia Stock Exchange. Using a case study strategy, the research focuses on the mining sector to provide a comprehensive analysis of carbon disclosure practices within the industry. The study relies exclusively on secondary data obtained from publicly available annual reports and sustainability reports published on the Indonesia Stock Exchange (IDX) website and the official websites of the sampled companies. By combining cross-sectional and longitudinal data, the research captures variations across companies and over the 2019–2023 observation period without manipulating the research variables.

The data gathering process entails an exhaustive review of extant scholarly writings and systematic retrieval of archival records, primarily consisting of authenticated corporate documentation. The selection of observational units adheres to a non-randomized sampling technique, guided by deliberate considerations such as data completeness and institutional engagement in carbon transparency efforts. Each construct within the model is quantified by reference to rigorously delineated operational definitions to uphold the precision and pertinence of measurement. Analytical procedures involve inferential assessments to evaluate the statistical significance of linkages among explanatory variables and the response variable.

In this research, the population comprises all mining companies listed on the Indonesia Stock Exchange during the 2019–2023 period, totaling 90 companies annually or 450 firm-year observations. The sample was selected using purposive sampling based on predetermined criteria, including companies consistently listed during the observation period and those publishing complete annual and sustainability reports. Following the recommendations of Green (1991) and Hair et al. (2010), a minimum of 50–100 observations is considered adequate for multiple regression analysis. Based on these criteria, 12 companies were selected, resulting in 60 firm-year observations. Although the number of companies is limited, the panel data approach strengthens the analysis by incorporating observations across multiple years, thereby enhancing the validity and reliability of the research findings. The CSR department was measured using the GRI-4 index, leverage was measured by the Debt-to-Equity Ratio (DER), and good corporate governance was proxied by the board of directors.

The empirical data were analyzed using panel data regression to evaluate both the simultaneous and partial effects of the independent variables on carbon emission disclosure. Before hypothesis testing, the regression model was subjected to a normality test, multicollinearity, and heteroscedasticity to verify compliance with the classical assumptions. Model adequacy was subsequently assessed through the coefficient of determination (R^2) and the F-test, which measure the explanatory power of the independent variables and their collective significance. Individual hypotheses were examined using the t-test to determine the partial effect of each predictor, namely the CSR department, leverage, and good corporate governance, on carbon emission disclosure. Statistical significance was evaluated at the 5% level ($\alpha = 0.05$), where probability values below 0.05 indicate a significant relationship between the independent and dependent variables.

RESULTS

Descriptive statistics were conducted to describe the characteristics of the research variables, including Carbon Emission Disclosure (CED), CSR department, leverage, and good corporate governance. The descriptive analysis presents the minimum value, maximum value, mean, and standard deviation of each variable, allowing a preliminary understanding of the distribution and variability of the panel data before hypothesis testing.

Table 1. Descriptive Statistics

Statistics	Carbon Emission Disclosure	CSR Department	Leverage	Good Corporate Governance
Mean	0.718519	0.405861	1.681946	5.833333
Median	0.722222	0.439560	1.022708	5.500000
Maximum	1.000000	0.747253	24.84892	15.00000
Minimum	0.277778	0.109890	0.050454	2.000000
Std. Dev.	0.156423	0.182214	3.306791	2.344606

Table 1 shows that carbon emission disclosure has an average value of 0.7185, indicating that the sampled companies generally disclose a relatively high proportion of carbon emission information. The CSR department variable has an average value of 0.4058 with a standard deviation of 0.1822, suggesting moderate variation among companies regarding CSR implementation. Leverage records the highest variability, reflected by a standard deviation of 3.3067, indicating considerable differences in financing structures across companies. Meanwhile, the average of good corporate governance is 5.83, showing that most companies have relatively similar board structures. The descriptive statistics indicate sufficient variation across observations to support panel data regression analysis.

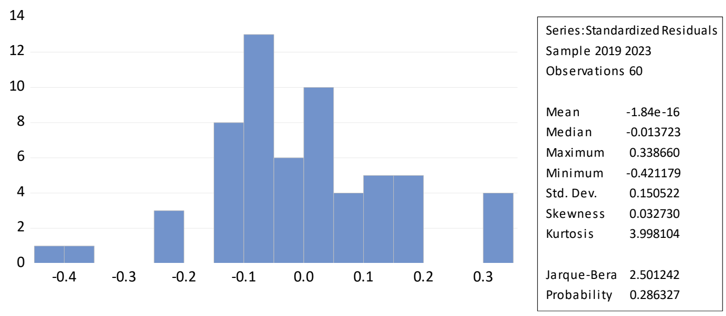

Figure 2. Normality Test Result

The purpose of the normality test is to determine whether there are confounding variables or residuals in the regression model that have a normal distribution. Good data is data that is normally distributed. The normality test in this thesis uses the assumption that if the probability value in the study is greater than 0.05, then the data are normally distributed. An ideal regression model is characterized by residual components that adhere to a pattern of normal distribution. Drawing upon the empirical findings presented in Figure 2, the examination of normality reveals that the residuals within this analytical framework exhibit conformity with the principles of normal distribution. This inference is substantiated by the probability value of 0.286, which exceeds the threshold of 0.05. Accordingly, it may be inferred that the foundational assumptions requisite for conducting a valid normality assessment in regression analysis have been satisfactorily fulfilled.

Table 2. Multicollinearity Test

Variable	CSR Department	Leverage	Good Corporate Governance
CSR Department	1.000000	0.023180	0.182816
Leverage	0.023180	1.000000	0.228394
Good Corporate Governance	0.182816	0.228394	1.000000

Multicollinearity testing was conducted to examine whether high correlations exist among the independent variables. A correlation coefficient below 0.80 indicates that multicollinearity is not present in the regression model. As presented in Table 2, the correlation coefficients among the independent variables are all below 0.80. The highest correlation occurs between leverage and good corporate governance (0.228), followed by CSR department and good corporate governance (0.183), while the correlation between CSR department and leverage is only 0.023. These findings indicate that multicollinearity is not present, and therefore all independent variables can be included simultaneously in the regression model.

Table 3. Heteroscedasticity Test

Variable	Coefficient	Std. Error	t-statistic	Prob.
Constant	0.154051	0.058960	2.612818	0.0115
CSR Department	-0.101281	0.079579	-1.272700	0.2084
Leverage	-0.000959	0.003264	-0.293768	0.7700
Good Corporate Governance	7.63E-05	0.007732	0.009862	0.9922

The heteroscedasticity test was conducted using the Glejser test to determine whether the residual variance remained constant across observations. Table 3 shows that the probability values for the CSR department (0.2084), leverage (0.7700), and good corporate governance (0.9922) are all greater than 0.05. Therefore, the regression model does not suffer from heteroscedasticity, indicating that the residual variance is homoscedastic and that the regression assumptions have been satisfied.

Before estimating the regression model, panel data model selection was conducted to determine the most appropriate estimation technique among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The selection process employed the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test.

Table 4. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	6.266951	(11,45)	0.0000
Cross-section Chi-square	55.738709	11	0.0000

The Chow Test compares the common effect model and the fixed effect model. Results in Table 4 indicate that the cross-section chi-square probability is 0.0000, which is lower than the significance level of 0.05. Therefore, the fixed effect model is preferred over the common effect model, and further testing using the Hausman Test is required.

Table 5. Hausman and Lagrange Multiplier Test

Test Summary	Value
Hausman Test	Chi-Sq. Statistic = 2.237488 Chi-Sq. d.f.= 3 Prob = 0.5246
Lagrange Multiplier Test	Breusch-Pagan Cross-Section = 25.91745 Prob = 0.000

The Hausman Test was conducted to determine whether the fixed effect model or the random effect model should be selected. According to Table 5, the probability value of 0.5246 exceeds 0.05, indicating that the random effect model is preferable. Since the conclusions of the Chow Test and Hausman Test differ, the Lagrange Multiplier Test was subsequently performed. The Lagrange Multiplier (LM) Test compares the common effect model and the random effect model. The Breusch–Pagan probability value of 0.0000 is below 0.05, indicating that the random effect model is more appropriate than the common effect model. Accordingly, the random effect model was selected as the final estimation model for this study.

Table 6. Model Fit Test

Parameter	Value
Root MSE	0.102090
Mean dependent var	0.266293
S.D. dependent var	0.110561
Sum squared resid	0.625343
Durbin-Watson stat	2.108967
R-squared	0.132914
Adjusted R-squared	0.086463
S.E. of regression	0.105673
F-statistic	2.861369
Prob(F-statistic)	0.044859

Based on Table 6, the coefficient of determination, denoted as R squared, serves as an instrument to gauge the proportionate extent to which the collection of independent variables accounts for variation in the dependent variable, within the confines of the regression framework. The R squared is found to be 0.132. This indicates that 13.2% of the variation in carbon emission disclosure is attributable to the combined explanatory capacity of the CSR department, leverage, and good corporate governance variables. The relatively modest explanatory power of the model is predominantly due to the CSR department being the sole influential factor in this context. The CSR department frequently acts as the principal catalyst for corporate transparency in articulating environmental repercussions, including emissions of carbon. In contrast, leverage and good corporate governance appear to exert minimal direct influence, as these constructs are more intricately aligned with financial oversight, which may not consistently intersect with decisions surrounding carbon-related disclosures. The remaining 86.8 percent of the variance is presumably accounted for by alternative factors not encompassed within the model.

The simultaneous test, known as the F test, constitutes a form of hypothesis examination intended to ascertain whether the entirety of the independent variables incorporated within this thesis exert a collective influence on the dependent variable. Referring to the analytical outcomes presented in Table 6, the computed F statistic is 2.86, accompanied by a probability value of 0.044, which is lower than the critical threshold of 0.05. This indicates that the variables encompassing the CSR department, leverage, and good corporate governance jointly exhibit a statistically significant impact on carbon emission disclosure.

Table 7. t-Test Result

Variable	Coefficient	Std. Error	t-statistics	Sig.
Constant	0.578279	0.086445	6.689591	0.0000
CSR Department	0.350874	0.121872	2.879032	0.0056
Leverage	0.003179	0.005107	0.622474	0.5362
Good Corporate Governance	-0.001288	0.011522	-0.111786	0.9114

The Random Effect Model selected through panel data model selection produced the following regression equation: CED = 0.578 + 0.351(CSR Department) + 0.003(Leverage) − 0.001(Good Corporate Governance). Based on Table 7, the results showed that the CSR department yields a probability value of 0.0056, which is lower than 0.05. Consequently, the null hypothesis is dismissed, and the alternative hypothesis is accepted. This affirms that the CSR department exerts a statistically significant influence on carbon emission disclosure. The coefficient of 0.35084 illustrates a positive relationship, implying that the presence or effectiveness of the CSR department enhances the extent of carbon emission disclosure.

Leverage presents a probability value of 0.536, which exceeds the threshold of 0.05. Therefore, the null hypothesis is upheld, and the alternative hypothesis is declined. It follows that leverage does not possess a significant influence on carbon emission disclosure. The coefficient value of 0.0031 suggests an inconsequential impact, indicating that fluctuations in leverage are not meaningfully associated with changes in carbon emission disclosure. The good corporate governance records a probability value of 0.911, surpassing 0.05. This leads to the acceptance of the null hypothesis and the rejection of the alternative. Hence, good corporate governance does not significantly affect carbon emission disclosure. The coefficient of -0.0012 implies a negligible inverse relationship, which, despite its direction, lacks statistical and practical relevance. It is therefore concluded that good corporate governance does not contribute materially to variations in carbon emission disclosure.

DISCUSSION

The regression analysis demonstrates that the CSR department has a positive and statistically significant effect on Carbon Emission Disclosure (CED), indicating that companies with stronger CSR functions are more likely to disclose carbon emission information comprehensively. A dedicated CSR department facilitates the implementation of low-carbon initiatives, including energy efficiency, renewable energy adoption, and improved waste management, while strengthening collaboration with internal and external stakeholders to support sustainable business practices (Dewi & Fitriani, 2024). Furthermore, the CSR department plays a crucial role in coordinating emission reduction programs, integrating sustainability into corporate strategy, and maintaining stakeholder engagement, thereby enhancing environmental accountability and transparency (Cahyaningsih & Septyaweni, 2022). Consequently, companies with stronger CSR commitments tend to be more proactive in reporting their environmental impacts, whereas weaker CSR functions may result in lower disclosure levels. These findings are consistent with Zulkifli (2025), who found that higher Corporate Social Responsibility Disclosure (CSRD), measured using the GRI G-4 Index, significantly improves Carbon Emission Disclosure. This result also supports the conclusion of Cahyaningsih and Rahmadiah (2024) that strong CSR practices contribute positively to corporate environmental transparency.

The regression analysis indicates that leverage has no significant effect on carbon emission disclosure, suggesting that a company's debt level does not substantially influence its carbon reporting practices. Although firms with higher leverage are generally subject to greater monitoring by creditors and investors, such pressure appears insufficient to encourage more extensive carbon emission disclosure in the energy and mining sectors (Almuaromah & Wahyono, 2022). This may be attributed to the absence of stringent regulations governing carbon disclosure in Indonesia, reducing companies' incentives to report environmental impacts comprehensively (Cahyaningsih & Septyaweni, 2022). Moreover, firms in these sectors often prioritize operational performance and short-term profitability over voluntary environmental transparency. As a result, financial obligations reflected by leverage are less influential than strategic business priorities in determining disclosure practices. These findings are consistent with Widianto and Sari (2020), who found that leverage, measured by the debt-to-equity ratio, does not significantly affect carbon emission disclosure. They argued that limited stakeholder pressure for environmental accountability may explain the insignificant relationship between leverage and carbon emission reporting.

The regression analysis indicates that good corporate governance has no significant effect on carbon emission disclosure, suggesting that board size or strength alone does not determine the extent of environmental disclosure. Although the board of directors is responsible for formulating corporate strategies and sustainability policies, carbon emission reporting may not be prioritized in the energy and mining sectors due to limited regulatory pressure and relatively low stakeholder demand for transparent environmental information (Kılıç & Kuzey, 2018). This condition is reflected in ITMG's 2023 sustainability report, where employee training hours increased by 279%, while improvements in greenhouse gas emission intensity reached only 22%, indicating a greater emphasis on social initiatives than environmental performance. Furthermore, companies with strong governance structures may still lack integrated sustainability strategies, while external factors such as government regulations, reporting frameworks, and industry practices may play a more decisive role in shaping disclosure. These findings are consistent with the study by Amaliyah and Solikhah (2019), who also concluded that good corporate governance does not significantly influence carbon emission disclosure.

The F-test results indicate that the CSR department, leverage, and good corporate governance simultaneously have a significant effect on carbon emission disclosure. This finding suggests that environmental transparency is not determined by a single organizational factor but rather by the combined influence of sustainability governance, financial accountability, and corporate governance. A dedicated CSR department encourages sustainability initiatives, leverages accountability to creditors and investors, while good corporate governance provides strategic oversight to integrate environmental objectives into corporate decision-making (Román et al., 2021; Meiryani et al., 2023; Rangkuti et al., 2025). Therefore, the interaction of these factors strengthens corporate commitment to transparent carbon emission disclosure and supports broader sustainability objectives.

CONCLUSION

This study concludes that the CSR department has a positive and significant effect on carbon emission disclosure. Firms with dedicated CSR functions tend to disclose environmental information more transparently, reflecting their role in coordinating sustainability initiatives, enhancing stakeholder engagement, and strengthening corporate accountability. In contrast, Leverage does not significantly affect carbon emission disclosure, indicating that financial pressure from creditors is not a consistent driver of environmental reporting in Indonesia's mining sector, likely due to a stronger focus on short-term financial performance. Similarly, good corporate governance shows no significant effect, suggesting that governance mechanisms have not yet fully integrated environmental transparency into strategic corporate decision-making.

The findings highlight that specialized internal sustainability mechanisms, particularly CSR departments, play a more decisive role in encouraging carbon emission disclosure compared to financial structure and general governance mechanisms. This implies that companies should strengthen the institutional capacity of CSR units by providing adequate authority, resources, and integration into corporate strategy to enhance environmental accountability. From a policy perspective, regulators are encouraged to reinforce mandatory environmental reporting standards and ensure that governance frameworks explicitly incorporate sustainability indicators to improve corporate transparency.

This study has several limitations. First, the sample is restricted to 12 mining companies with 60 observations, which may limit generalizability to other sectors or larger populations. Second, the use of a single proxy for governance (board of directors) may not fully capture the complexity of good corporate governance. Third, the model explains only 13.2% of the variation in carbon emission disclosure, indicating the presence of other influential factors not included in this study. Future research is recommended to expand the sample across multiple industries, incorporate broader governance indicators such as board independence or environmental committees, and include additional variables such as firm size, profitability, or ESG performance to improve explanatory power and provide a more comprehensive understanding of carbon emission disclosure behavior.

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