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The Effect of Carbon Emissions Disclosure on Earnings Management in Indonesian Mining Companies

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ABSTRACT: This study aims to investigate the effect of carbon emissions disclosure on earnings management in Indonesian mining companies. This study uses two competing theories, namely stakeholder theory and agency theory, to explain how carbon emissions disclosure affects earnings management. The sample of this study consists of 26 Indonesian mining companies listed on the Indonesian Stock Exchange (IDX) from 2021-2023, with a total of 78 observations. The data analysis technique is Partial Least Squares (PLS). The result of this study shows that carbon emissions disclosure does not affect earnings management. The different results may be explained by legitimacy theory, where mining companies disclose sustainability information merely to maintain legitimacy, not as a tool for financial management. Strong pressure from external parties and a high public visibility may cause companies in the mining industry to disclose carbon emissions merely to comply with regulations or respond to external pressures, without genuinely implementing substantive sustainability commitments; therefore, carbon emissions disclosure is not directly related to earnings management.

KEYWORDS: Carbon emissions disclosure, earnings management, and Indonesian mining companies

I. INTRODUCTION

The issue of climate change has become a major concern in the past decade since it has a negative impact on humans and the environment, such as extreme weather, ecosystem damage, sea level and temperature rise, etc. One of the major factors that influences climate change is carbon emissions. According to Climate Watch (2022), the energy sector produced 75% of carbon emissions worldwide in 2021. In particular, the industry sector contributed 6,6% of carbon emissions worldwide. Therefore, the company needs to pay attention to this issue, since there is increasing pressure from stakeholders for the company to provide transparent data about carbon emissions disclosure. Furthermore, companies are considered accountable for the environmental impact because of their activity (Wulan, 2022). In addition, the company's negligence in its activities leads to increased carbon emissions (Nasih et al., 2019).

In the context of Indonesia, according to Climate Watch (2022), Indonesia ranks sixth globally as the producer of carbon emissions, with the majority of carbon emissions coming from peatland and forest clearance. In addition, Indonesia became the largest producer of carbon emissions in Southeast Asia, with a total of 590 million metric tons of carbon emissions (Kameke, 2022). To reduce carbon emissions, Indonesia ratified the Kyoto Protocol through Law No. 17 of 2004, which commits to greenhouse gas emissions reduction. In addition, Indonesia has committed to achieving net-zero emissions by 2060. Therefore, research about carbon emission disclosure has become important, particularly in the context of Indonesia.

Prior studies have considered factors that affect carbon emissions disclosure, such as firm characteristics (Bae Choi et al., 2013; Chu et al., 2013; Rosita et al., 2022; Saraswati et al., 2021; Wahyuningrum et al., 2024), board characteristics (Saraswati et al., 2021; Wahyuningrum et al., 2024; Wulan, 2022), ownership structure (Bedi & Singh, 2024; Rosita et al., 2022; Singhania & Bhan, 2024; Wahyuningrum et al., 2024; Wulan, 2022), industry types (Ott et al., 2017). However, these studies are still focused on the determinants of carbon emissions disclosure. Research that focuses on the outcome of carbon emissions disclosure, like earnings management, is still limited (Bilal et al., 2022; Han et al., 2023; Lemma et al., 2020; Luo & Wu, 2019). Earnings management is an action deliberately carried out by company management to report accounting profits that do not reflect the actual conditions, with the aim of influencing stakeholders to maximize personal interests or for certain interests. The research on earnings management has become important since there have still been some cases of financial fraud that have been conducted through earnings management in recent years. In relation to carbon emission disclosure, it becomes important to examine the relationship between carbon emissions disclosure and earnings management since companies have different motivations for disclosing carbon emissions, namely to behave ethically or to cover up opportunistic behavior in the form of earnings management. This study uses two competing theories, namely stakeholder theory and agency theory, to explain companies'

behavior for disclosing carbon emissions information. Furthermore, research that is conducted in developing countries like Indonesia is still limited (Mayapada, 2025).

This study focuses on the mining industry in Indonesia. The mining industry becomes the main focus of this study for several reasons. First, the mining industry has high public visibility because of its environmental issues (Kumala & Siregar, 2021). The mining industry sector, such as oil, gas, and coal, is the largest producer of carbon emissions in Indonesia, with the total use of fossil energy being 70% of the energy consumed (Nasih et al., 2019). Second, the mining industry sector has a significant effect on the Indonesian national economy, contributing 10% of Indonesian Product Domestic Bruto (PDB) (Kementerian Energi dan Sumber Daya Mineral, 2024). In addition, mining products are the main export commodities in Indonesia. Therefore, based on the problem and research gap, this study aims to examine the effect of carbon emission disclosure on earnings management in Indonesian Mining Companies.

II. LITERATURE REVIEW

A. Stakeholder Theory

Stakeholder theory explains why companies engage in social responsibility activities and disclosures. Stakeholders are parties with an interest in a company, such as shareholders, employees, creditors, suppliers, the government, consumers, and other parties who can influence the company. Furthermore, a company's existence is greatly influenced by support from stakeholders (Andrian & Murwaningsari, 2021; Kumala & Siregar, 2021). Therefore, stakeholder theory explains that a company's business activities are not solely aimed at its own interests, but also at providing benefits to stakeholders and fostering good relationships with them (Andrian & Murwaningsari, 2021; Kumala & Siregar, 2021). Companies accomplish this through social responsibility activities and disclosure of social responsibility in their financial statements, involving disclosure of carbon emission information. Therefore, social responsibility activity and disclosure aim to meet stakeholder expectations and implement a social contract with stakeholders (Kumala & Siregar, 2021; Muttakin et al., 2015). In relation to earnings management, stakeholder theory suggests that companies that disclose information about carbon emissions are less likely to engage in earnings management since earnings management contradicts the stakeholder interest. Therefore, stakeholder theory supports the hypothesis of ethical behavior in companies that disclose carbon emissions information.

B. Agency Theory

Agency theory explains corporate behavior that impacts earnings quality and its relationship to social responsibility. Earnings management, which is an indicator of earnings quality, is based on agency theory. This theory explains the separation of roles between the principal (the company owner) and the agent (the company management). This separation results in a contractual relationship between the owner and the company management (Jensen & Meckling, 1976). In this relationship, the owner delegates authority and responsibility for the company to management. Furthermore, management acts as a representative of the owner in running the company's business operations and acts in accordance with the owner's interests. However, the separation of roles between management and the company's owners can give rise to agency problems. Jensen & Meckling (1976) explain that agency problems arise when company management acts to maximize its own interests, which can harm the interests of the owners and reduce their wealth. This is done by company management through earnings management. The conflict of interest between company management and the owners is called a type 1 agency conflict. In the context of the relationship between carbon emissions disclosure and earnings management, a company’s managers can use social responsibility information, like carbon emission disclosure, to hide their opportunistic behavior in the form of earnings management (Kumala & Siregar, 2021; Mayapada, 2025; Muttakin et al., 2015) to increase stakeholder satisfaction, enhance the company's image, and maintain the company's reputation among stakeholders (Prior et al., 2008). Furthermore, based on agency theory, agency conflicts between management and owners can cause company management to engage in earnings management and use corporate social responsibility to conceal and legitimize opportunistic behavior in the form of earnings management (Dissanayake et al., 2023; Kumala & Siregar, 2021). Therefore, agency theory supports the hypothesis of opportunistic behavior in companies that disclose carbon emissions information.

C. The Effect of Carbon Emissions Disclosure on Earnings Management

This study uses two competing theories to explain the relationship between carbon emissions disclosure and earnings management. As explained before, stakeholder theory explains that firms voluntarily disclose their carbon emission information to meet stakeholder expectations and implement the social contract so that they can establish long-term relationships with all stakeholders. Therefore, companies that disclose carbon emissions information are less likely to conduct earnings management since companies will behave ethically to protect their reputation towards stakeholders in order to maintain a good relationship. This argument is supported by several studies. For example, Mayapada (2025) suggests that carbon emissions disclosure functions as a complementary mechanism for engaging with all stakeholders. Therefore, companies that disclose carbon emissions information should have lower earnings management. This study finds that companies disclosing carbon emission information show less earnings management. Luo & Wu (2019) argue that managers who have a concern with a company's reputation would

avoid earnings management practices. This study finds that voluntary carbon transparency is negatively associated with earnings management. Lemma et al. (2020) argue that companies may reduce asymmetric information and enhance their financial reporting quality by signaling more transparent and carbon-related information. In addition, Lemma et al. (2020) explain that carbon emission disclosure is based on integrity, honesty, and ethics in its business practices. Lemma et al., (2020) find that firms that provide better quality of voluntary carbon disclosure provide better financial report quality.

The agency theory explains that the separation of roles between management and the company's owners can give rise to agency problems that lead to opportunistic behavior. Agency problems arise when company management acts to maximize its own interests, which can harm the interests of the owners and reduce their wealth. In the context of carbon emission disclosure, companies may disclose carbon emissions information to cover up for their opportunistic behavior (Bilal et al., 2022; Mayapada, 2025). This argument is supported by prior research. For example, Houqe et al. (2024) explain that managers may use discretionary carbon emission information to hide poor performance and manipulate shareholders' perception about companies. This study finds a positive association between carbon emissions and real earnings management. Velte (2021) argues that if companies can use environmental (carbon) performance as a greenwashing policy, they may also be involved in earnings management practices. In this study, Velte (2021) find that environmental (carbon) performance increases real earnings management. Astari et al. (2020) explain that disclosure of social responsibility information, like carbon emission information, is used to cover earnings management. They find that earnings management has a significant positive effect on carbon emission disclosure, indicating that management uses carbon emission disclosure to hide their opportunistic behavior.

Based on the research problem, the debate between stakeholder theory and agency theory, and prior research, this study proposes and develops the following hypothesis.

H: Carbon emissions disclosure has a significant effect on earnings management in Indonesian Mining Companies.

III. RESEARCH METHODOLOGY

A. Research Design

This study uses a quantitative approach to test the hypothesis. The data of this study are obtained from mining companies listed on the Indonesian Stock Exchange (IDX). The total population of this study consists of 63 companies in the mining sector from 2021 to 2023. This study uses 2021 as the starting year period since there is a limitation of data availability in carbon emission information before 2021. The sampling technique is purposive sampling. After eliminating companies that did not publish a sustainability report from 2021 to 2023, the final sample is 26 mining companies with a total of 78 firm-year observations. This study uses 1 dependent variable, namely earnings management, 1 independent variable, namely carbon emission disclosure, and 5 control variables, namely firm size, leverage, return on assets, return on equity, and audit quality.

B. Method of Collecting Data and Measurement

This study uses archival data that are collected from annual reports and sustainability reports for all variables. The variable of earnings management is proxied by the level of discretionary accruals, which is measured based on the modified Jones model developed by Dechow et al. (1995). In this model, discretionary accruals is calculated as the difference between the firm's total accruals (TAC) and its non-discretionary accruals (NDAC). Total accruals is measured by the following equation.

$$TAC_{it} = NI_{it} - CFO_{it}$$

Where,

TAC_{it} = total accruals of firm i and year t

NI_{it} = net income of firm i and year t

CFO_{it} = cash flow of firm i and year t

After calculating the total accruals of firm i and year t, we estimate the coefficient of α by conducting the following regression for each company in 5 years.

$$TAC_{it}/A_{it-1} = \alpha_1(1/A_{it-1}) + \alpha_2(\Delta REV_{it})/A_{it-1}) + \alpha_3(PPE_{it}/A_{it-1}) + \varepsilon$$

Where,

TAC_{it} = total accruals of firm i and year t

A_{it-1} = total assets of firm i and year t-1

ΔREV_{it} = changes in revenue of firm i and year t

ΔPPE_{it} = plant, property, and equipment of firm i and year t

The coefficient of α is used to calculate non-discretionary accruals (NDAC) for each company using the following equation.

$$NDAC_{it} = \alpha_1(1/A_{it-1}) + \alpha_2((\Delta REV_{it} - \Delta REC_{it})/A_{it-1}) + \alpha_3(PPE_{it}/A_{it-1})$$

Where,

$NDAC_{it}$ = non discretionary accruals of firm i and year t
A_{it-1} = total assets of firm i and year t-1
ΔREV_{it} = changes in revenue of firm i and year t
ΔREC_{it} = changes in receivable of firm in and year t
ΔPPE_{it} = plant, property, and equipment of firm i and year t

Finally, the level of discretionary accruals for each company can be calculated by the following equation.

$$DAC_{it} = (TAC_{it}/A_{it-1}) - NDAC_{it}$$

Where,

DAC_{it} = discretionary accruals of firm i and year t.
TAC_{it} = total accruals of firm i and year t
A_{it-1} = total assets of firm i and year t-1
$NDAC_{it}$ = non-discretionary accruals of firm i and year t

The variable of carbon emission disclosure is measured using a content analysis from the company's sustainability report based on indicators from the GRI Standard Index, particularly GRI 305: emissions. This standard consists of seven disclosures, namely disclosures of:

1) direct (scope 1) greenhouse gas (GHG) emissions,
2) energy indirect (scope 2) GHG emissions,
3) other indirect (scope 3) GHG emissions,
4) GHG emissions intensity,
5) reduction of GHG emissions,
6) emissions of ozone-depleting substances (ODS)
7) nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions.

Each carbon emissions disclosure item is given a value of 1 if it is reported and 0 if it is not reported in the company's sustainability report. The scores for each item will be added up to obtain an overall company score. The following is the formula for calculating carbon emissions disclosure (CED).

$$CEDI_j = \frac{\Sigma x_j}{n_j}$$

Where,

$CEDI_j$ = carbon emissions disclosure index based on GRI 305: emissions
ΣX_j = number of items disclosed by company j
1: if item i is disclosed; 0: if item i is not disclosed
n_j = the number of items in the GRI 305: emissions guidelines is 7 items

The data of variable control, namely firm size, leverage, return on assets, return on equity, and audit quality, are hand-collected from annual reports and calculated manually. Variable firm size is proxied using the natural logarithm (ln) of a company's total assets. Variable leverage is calculated using the debt-to-equity ratio. Variable return on assets (ROA) and return on equity (ROE) represent companies profitability, measured using the ROA and ROE ratios. Variable audit quality is measured with a dummy variable, given a value of 1 if the company is audited by a Big 4 auditor, and 0 if it is not.

C. Data Analysis Techniques

This study uses the partial least squares (PLS) approach to test the hypothesis. PLS is used in this study because the results of the data normality test show that the data distribution is not normal. Different from other multivariate techniques, PLS is not dependent on the data distribution normality to test hypotheses. The research model is shown as follows.

$$EM = \alpha + \beta_1 CED + \beta_2 Ln\_Size + \beta_3 LEV + \beta_4 ROA + \beta_5 ROE + \beta_6 AUD + \varepsilon$$

where:

EM = earnings management proxied by discretionary accruals from the Modified Jones Model (Dechow et al., 1995)
CED = carbon emissions disclosure based on GRI 305: emissions
Ln_Size = natural logarithm of the company's total assets
LEV = leverage proxied by debt-to-equity ratio
ROA = return on assets
ROE = return on equity

AUD = audit quality
ε = error term

IV. RESULT AND DISCUSSION

A. Description of Research Data

The data description of earnings management (EM), carbon emissions disclosure (CED), natural logarithm of firm size (Ln_Size), leverage (LEV), return on assets (ROA), return on equity (ROE), and audit quality (AUD) is presented in Table 1. According to Table 1, the variable of earnings management (EM) has a minimum value of -1,18 and a maximum value of 4,5, with an average value of 0,2351. The variable of carbon emissions disclosure (CED) has a minimum value of 0 and a maximum value of 1, with an average value of 0,4505. This means that companies in the mining industry have a relatively moderate carbon emissions disclosure, with an average disclosure of carbon emission information is 45,05%. The variable of the natural logarithm of firm size (Ln_Size) has a minimum value of 15,52 and a maximum value of 22,73, with an average of 19,7892. The variable of leverage has a minimum value of 0,03 and a maximum value of 5,53, with an average of 0,8064. The variable of return on assets (ROA) has a minimum value of -0,12 and a maximum value of 0,62, with an average of 0,1336. The variable of return on equity (ROE) has a minimum value of -0,53 and a maximum value of 1,25, with an average of 0,2139. The variable of audit quality (AUD) has a minimum value of 0,00 and a maximum value of 1,00, with an average of 0,4615.

Table 1. Description of Research Variable

Variable	N	Minimum	Maximum	Average	Standard Deviation
EM	76	-1,18	4,50	0,2351	1,02180
CED	76	0,00	1,00	0,4505	0,29311
Ln_Size	76	15,52	22,73	19,7892	1,82410
LEV	76	0,03	5,53	0,8064	0,99811
ROA	76	-0,12	0,62	0,1336	0,15714
ROE	76	-0,53	1,25	0,2139	0,29040
AUD	76	0,00	1,00	0,4615	0,50175

B. Hypothesis Testing

The result of hypothesis testing is presented in Table 2. Table 2 shows that the variable of carbon emissions disclosure (CED) has a positive coefficient with a value of 0,082 but is not significant (sig.p-value more than 0,05). The result means that carbon emissions disclosure in Indonesian Mining Companies does not affect earnings management. Therefore, it can be concluded that the hypothesis in this study is not supported. Furthermore, 4 variable controls, namely, firm size (Ln_Size), Leverage (LEV), return on assets (ROA), and return on equity (ROE) show significant values (sig.p-value less than 0,05) with varied direction of coefficient. The variable of firm size (Ln_Size) has a negative coefficient with a value of -0,309. It means that firm size negatively affects earnings management. The larger (smaller) the firm size means that the smaller (larger) the earnings management. The variable of leverage (LEV) has a positive coefficient with a value of 0,290. It means that leverage positively affects earnings management. The larger (smaller) the leverage means that the larger (smaller) the earnings management. The variable of return on assets (ROA) has a positive coefficient with a value of 0,735. It means that return on assets positively affects earnings management. The larger (smaller) the return on assets means that the larger (smaller) the earnings management. The variable of return on equity (ROE) has a negative coefficient with a value of -0,692. It means that return on equity negatively affects earnings management. The larger (smaller) the return on assets means that the smaller (larger) the earnings management. On the other hand, the variable of audit quality (AUD) has a positive coefficient with a value of 0,104 but is not significant (sig.p-value more than 0,05). It means that audit quality does not affect earnings management.

Table 2. The Result of PLS Testing

Variable	Path Coefficient	P-Values
CED → EM	0,082	0,420
Ln_Size → EM	-0,309	0,006***
LEV → EM	0,290	0,000***
ROA→ EM	0,735	0,001***
ROE → EM	-0,692	0,006***
AUD → EM	0,104	0,455
Observations	76	
R Square	0,147	
Adjusted R Square	0,075	

C. Discussion

Based on the PLS testing result, carbon emissions disclosure does not affect earnings management. This means that the hypothesis in this study is not supported. The result of this study is not consistent with previous research, which finds that carbon emissions disclosure positively affects earnings management (Lemma et al., 2020; Luo & Wu, 2019; Mayapada, 2025), and previous research, which finds that carbon emissions disclosure negatively affects earnings management (Astari et al., 2020; Houqe et al., 2024; Velte, 2021). This study also does not support both stakeholder theory and agency theory. Stakeholder theory explains that a company needs to provide benefits to stakeholders and maintain good relationships with them. It can be implemented through social responsibility activities and disclosure of social responsibility in their financial statements, involving disclosure of carbon emission information. Therefore, stakeholder theory suggests that companies that disclose information about carbon emissions are less likely to engage in earnings management since earnings management contradicts the stakeholder interest. On the contrary, agency theory explains that a company's managers can use social responsibility information, like carbon emission disclosure, to hide their opportunistic behavior in the form of earnings management. Therefore, according to agency theory, carbon emissions disclosure has a positive effect on earnings management.

The result of this study is not consistent with previous research and theory, probably because of a specific reason. This study is specifically focused on the mining industry in Indonesia. Companies in the mining industry are known as having high public visibility because of their environmental issues (Kumala & Siregar, 2021), like deforestation, air pollution, and climate change. Therefore, there is a strong pressure from the government (in the form of regulation), Non-Governmental Organizations (NGO), the media, and other external parties that demand transparent information about disclosure of carbon emissions, environmental impact, and ecological recovery plans. As a result of much pressure from external parties, companies in the mining industry may disclose carbon emissions merely to comply with regulations or respond to external pressures, without genuinely implementing substantive sustainability commitments. Such symbolic disclosure is not directly related to earnings management, as there is no real intention to influence earnings perception through ESG information. In addition, this result is in line with legitimacy theory, where companies disclose sustainability information merely to maintain legitimacy, not as a tool for financial management.

V. CONCLUSION, LIMITATION & FUTURE RESEARCH

A. Conclusion

This study aims to investigate the effect of carbon emissions disclosure on earnings management in Indonesian mining companies. This study uses two competing theories, namely stakeholder theory and agency theory, to explain how carbon emissions disclosure affects earnings management. However, the result of this study is not consistent with previous research and theory. The result of this study shows that carbon emissions disclosure does not affect earnings management. The inconsistent result may be due to the characteristics of the mining industries. Strong pressure from external parties and a high public visibility may cause companies in the mining industry to disclose carbon emissions merely to comply with regulations or respond to external pressures, without genuinely implementing substantive sustainability commitments. Such symbolic disclosure is not directly related to earnings management strategies, as there is no real intention to influence earnings perception through ESG information. In conclusion, the insignificant result may be explained by legitimacy theory, where companies disclose sustainability information merely to maintain legitimacy, not as a tool for financial management.

B. Limitation & Future Research

There are several limitations to this research. First, the data that is used in this study is limited to 2021-2023; future research can use data from a wider range to capture better results. Second, the sample that is used is limited to the mining companies, which may influence the insignificant result. Therefore, future research may use another company sector. Third, due to data limitations, the sample that is used only 26 of the total 63 mining companies listed on the IDX in 2021-2023; therefore, this may have an impact on the results.

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