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Carbon Emissions Disclosure: Evidence of Indonesian Mining Companies

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ABSTRACT

Purpose: The purpose of this study was to examine the effect of leverage, media exposure, profitability on carbon emission disclosure.

Design/methodology/approach: This study uses a quantitative approach to analyze causal relationships by utilizing secondary data. The population of this study are companies engaged in the mining sector and listed on the Indonesia Stock Exchange during the period 2018 to 2022. The sample selection was carried out using purposive sampling method.

Findings: The findings of this study reveal that leverage and media exposure have a positive and significant influence on carbon emissions disclosure, while profitability shows no significant impact.

Research limitations/implications: Limitations in this study only use the mining sector during 2018-2022, so the results may not be relevant for more recent sectors or years. Reliance on reports that may be incomplete and variations in secondary data may affect the results. In addition, this study does not consider other variables or significant changes in policies and markets.

Practical implications: Implications for regulators to design investment policies that promote transparency of carbon emissions, increasing investor confidence. The findings also support governments in developing regulations for cyber risk management reporting. In addition, companies can utilize the research results to identify key stakeholders, allocate resources more efficiently, and strengthen their competitive position.

Originality/value: The novelty in this research can explain the determinants of carbon emission disclosure from the stakeholder perspective of the theory.

Paper type: Research Paper

Keyword: *Leverage, Media Exposure, Profitability, Carbon Emission disclosure*

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I. INTRODUCTION

Increasingly extreme climate change and increasing global warming pose major challenges to business operations today Perera et al., (2023). Responses to these challenges include the development of low-emission products and the implementation of climate change mitigation policies, both at national and international levels Andreou & Kellard, (2021) and Xu et al., (2023). As a result, companies, particularly in carbon-based industries, are under increasing pressure from society Griffin et al., (2017). They are also increasingly considering the impact of their carbon emissions (Huang, 2021).

With the increasing importance of this issue in the eyes of governments around the world, 196 countries have agreed to the Paris Agreement. According to the United Nations Framework Convention on Climate Change (2015) Almaeda et al., (2023), this agreement stipulates that each participating country will commit to reducing their gas emissions to address climate change. The main focus of this agreement is to reduce carbon emissions,

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which are considered a major factor in global warming and environmental damage. One of the countries participating in this agreement is Indonesia, which encourages the business sector and society to reduce greenhouse gas emissions through Presidential Regulation No. 61 of 2011. This regulation regulates the National Action Plan for Greenhouse Gas Reduction (RAN-GRK).

Indonesia not only plays an important role in contributing to global carbon emissions but is also one of the largest markets in the world. Data from 1850 to 2021 shows that Indonesia ranks fifth in accumulated fossil and land carbon emissions, behind only the United States, China, Russia and Brazil Carbon Brief., (2021). This confirms Indonesia's involvement in the problem of rising global carbon emissions and its responsibility for climate change and environmental degradation.

Nonetheless, Indonesia's per capita greenhouse gas emissions are lower than the average for G20 countries. According to the Climate Transparency Report (2020), Indonesia seeks to reduce its greenhouse gas emissions through its NDC project with a target reduction of between 29 and 41% by 2030. Companies in Indonesia are also committed to supporting the Sustainable Development Goals in this endeavor.

The growing awareness of carbon emissions by stakeholders such as investors, creditors, governments, non-governmental organizations, and communities encourages companies to reduce carbon emissions by measuring, analyzing, recording, and reporting their emission levels I Made Narsa, (2021). Companies in Indonesia are committed to implementing initiatives that reduce the impact of carbon emissions on the environment. They regularly report on these efforts in their annual reports and sustainability reports. Carbon emissions disclosure has proven to be a crucial communication tool to ensure accountability and transparency of businesses regarding the amount and impact of their carbon emissions Ben-Amar & McIlkenny, (2015).

Companies that transparently disclose environmental information can increase their credibility in the eyes of society as they demonstrate clear environmental responsibility. This helps them in obtaining the resources and profits necessary for business continuity Reid & Toffel, (2020). It also encourages companies to be more committed to reducing carbon emissions in environmentally friendly sectors.

This study has important significance because it explores carbon emissions disclosure with a stakeholder theory approach that includes leverage, media exposure, and profitability. This research is focused on the mining industry listed on the Indonesia Stock Exchange in the period 2018 to 2022. The selection of this sector is based on data showing that Indonesia's mining sector led in greenhouse gas emissions at the national level in 2017, reaching 49% Sugardiman, (2019). This is also supported by the information that approximately 58% of Indonesia's electricity supply came from coal in 2017 Dunne, (2019).

This study aims to provide empirical evidence on the impact of profitability, leverage, and media exposure on carbon emissions disclosure. The findings of this study can also serve as a basis for regulators in formulating investment policies and for the government in developing regulations that encourage companies to increase transparency in reporting carbon emissions. In addition, the results of this study are also relevant for company management in designing policies and strategies related to carbon emissions disclosure.

A. Literature Review and Hypothesis Development

According to stakeholder theory, companies should operate their business by taking into account the interests of all parties involved, not just taking into account personal interests Chairi & Ghozali, (2014). Stakeholders have the right to obtain complete information about the company's activities, including disclosure of environmental information such as carbon emissions, which reflects the company's commitment to environmental issues.

Disclosure of carbon emissions is often considered a voluntary action aimed at enhancing the company's reputation, especially if the disclosed information illustrates the company's positive achievements. This voluntary disclosure refers to information provided by companies beyond the requirements of accounting regulations required by regulatory bodies Suwardjono, (2014). Financial Accounting Standard (PSAK) No. 1 of 2016 regulates those environmental reports must include this disclosure aspect. By making disclosures, companies demonstrate a high level of transparency, which can increase positive responses from stakeholders and build good relationships with them Pratiwi & Sari, (2016). Factors such as leverage, media exposure, and profitability levels may influence the extent to which companies disclose their carbon emissions. Previous studies by Jannah & Muid, (2014), Suhardi & Purwanto, (2015), and Zanra et al., (2020) have identified these variables as important factors in carbon emissions disclosure in Indonesia.

1. The effect of leverage on carbon emission disclosure

Profitability refers to the company's ability to generate profits (Kasmir, 2016). Companies that have a high level of leverage utilize assets and resources to increase potential profits for shareholders Sartono, (2016). Common metrics such as the Debt to Asset Ratio (DAR) can indicate how much a company relies on debt to finance its assets and operations. Higher levels of leverage generally result in a reduction in carbon emissions disclosure, as companies must manage funds carefully to reduce operational costs related to emissions reporting.

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Previous research on the effect of leverage on carbon emissions disclosure shows mixed findings. Wiratno & Muaziz, (2020) found that leverage has a positive effect on carbon emissions disclosure, while Saptiwi, (2019) and Septriyawati & Anisah, (2019) found the opposite relationship. On the other hand, research by Lu et al., (2015) and (Salehi et al., 2017) show that there is no significant relationship between leverage and carbon emission disclosure. Similar findings are also supported by research conducted by Zanra et al., (2020). Thus, it can be hypothesized that:

H1: Leverage has a positive effect on carbon emission disclosure

2. The effect of media exposure on carbon emission disclosure

According to Ulfa F & Ermaya, (2019), companies are expected to disclose social responsibility and relevant information to stakeholders, known as media exposure. This media exposure can significantly influence stakeholder responses and decisions towards the company (Pratiwi & Sari, 2016). The media plays a crucial role in conveying information to stakeholders about environmental conditions and company performance, including carbon emissions disclosure. Typically, this information is disclosed through various channels such as annual reports, sustainability reports, and corporate online platforms (Jannah & Muid, 2014). Media exposure to carbon emissions disclosure may encourage companies to be more active in informing their efforts to reduce environmental impacts.

Research on how media exposure affects carbon emissions disclosure shows variation in findings. Some studies note a positive impact of media exposure on carbon emissions disclosure, while other studies show a different or insignificant impact. For example, Septriyawati & Anisah, (2019) and Nastiti & Hardiningsih, (2022) found a positive relationship between media exposure and carbon emissions disclosure, while research by Laksani et al., (2021) noted a less positive relationship. Other studies, such as those conducted by (Lu et al., 2015) and (Salehi et al., 2017), show that media exposure has no significant relationship with carbon emissions disclosure. Based on these findings, the following hypothesis can be proposed:

H2: Media Exposure has a positive effect on carbon emission disclosure

3. The effect of profitability on carbon emission disclosure

Profitability refers to the ability of a company to generate profits (Kasmir, 2016). Companies that achieve high levels of profitability are more likely to disclose information about their carbon emissions, with the aim of attracting investor interest. Some studies such as those conducted by Jannah & Muid, (2014), and Zanra et al., (2020) support the idea that profitability has the potential to influence carbon emissions disclosure. Profitability is often measured by Return on Asset (ROA), which reflects how a company utilizes its assets to generate profits during a given period. ROA is used to compare the performance of similar companies and to evaluate a company's performance over time.

However, findings from studies on the correlation between profitability and carbon emissions disclosure show a variety of results. Some studies show a positive relationship between profitability and carbon emissions disclosure, but there are also studies that find different results or even show no significant relationship. For example, Nastiti & Hardiningsih, (2022), found that profitability has a positive effect on carbon emissions disclosure, while studies by Saptiwi, (2019) and Septriyawati & Anisah, (2019) found a less positive relationship. On the other hand, research by Lu et al., (2015) and (Salehi et al., 2017) showed that there is no significant relationship between profitability and carbon emission disclosure. From these various findings, the following hypothesis can be drawn:

H3: Profitability has a positive effect on carbon emission disclosure.

II. METHODS

This research uses quantitative methods to test cause-and-effect relationships using secondary data. The research population consists of companies in the mining sector listed on the Indonesia Stock Exchange during the period 2018 to 2022. Data was collected from published annual reports and sustainability reports, which have undergone an audit process by a public accounting firm to ensure accuracy and reliability. The sample selection was done by purposive sampling, with criteria including availability of annual reports, disclosure of information on carbon emissions, having positive equity, and complete data for this study. A total of 90 annual reports and sustainability reports that met these criteria were selected as samples.

The variable examined in this study is carbon emissions disclosure, which is measured using a disclosure index that applies a score of 1 for companies that disclose information in accordance with the set criteria, and a score of 0 for others. This approach follows the methodology used in a previous study by Choi et all., (2020).

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The independent variables analyzed include leverage, media exposure, and profitability. Leverage, described by Jannah & Muid, (2014), Suhardi & Purwanto, (2015), is measured by the ratio of debt to total assets of the company. Media exposure is measured by a dummy variable, where a value of 1 is assigned if the company discloses information on carbon emissions in their sustainability report or website, and 0 otherwise, according to the methodology used by Jannah & Muid, (2014), Ulfa & Ermaya, (2019). Profitability is measured by dividing net profit after tax by the company's total assets, referring to the approach used by Jannah & Muid, (2014).

$$CED = \alpha + \beta 2LEV + \beta 3ME + \beta 1PROF$$

CED	=	Carbon Emissions Disclosure
LEV	=	Leverage
ME	=	Media Exposure
PROF	=	Profitabilitas
α	=	Constant
β	=	Intercept
ε	=	Error Term

III. RESULTS AND DISCUSSION

The following is a brief description of the variables analyzed in this study and their characteristics. Table 1 shows the descriptive statistical results of this study, which include various variables related to carbon risk disclosure, leverage, media exposure, and corporate profitability. This data provides an overall picture of the distribution and average values of each variable under study.

Table 1. Descriptive statistics

Variable	*Maximum*	*Minimum*	*Mean*	*Std. Dev*
CED	*13.00*	*7.00*	*9.50*	*2.72*
LEV	*0.72*	*0.00*	*0.40*	*0.18*
ME	*0.98*	*0.19*	*0.65*	*0.21*
PROF	*0.31*	*0.00*	*0.02*	*0.17*
N	*90*			

Source: Data processed by authors using SPSS 26 (2024)

Table 1 displays the descriptive statistical results of this study. The average disclosure of cyber risk management is 9.50%, indicating that the level of disclosure of carbon emissions in Indonesian mining sector companies is still low, with variations between 7.00% and 13.00%. The average leverage value of 0.40% indicates that most of the company's funding is more dependent on debt than assets owned. Meanwhile, the average media exposure value of 65.4% indicates that the proportion of mining companies that disclose information about carbon emissions is quite significant. The average profitability of 2.00% indicates that the company generally generates profits with a return on assets of around 2.98%.

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Tabel 2. Classic Assumption Test

Criteria	*Normalitas*	*Multikolonieritas*	*Heteroskedastisitas*	*Autokorelasi*
A Sig K-S	*0.265*			
VIF		*< 10*		
Glesjer			*> 0.05*	
Durbin-Watson				*2.004 < 1675 < 2.363*

Source: Data processed by authors using SPSS 26 (2024)

Before proceeding with hypothesis testing, it is important to conduct classical assumption testing. There are four types of analysis used to test these assumptions, and the results show that all assumptions have been met. The normality test shows a significance value of 0.265, which is greater than 0.05, so it can be concluded that the data is normally distributed. In addition, the heteroscedasticity test shows that the significance value for each variable exceeds 0.05, indicating the absence of heteroscedasticity in the regression model. Thus, the regression model can be considered suitable for use in the analysis.

In the context of this study, the multicollinearity test is conducted by evaluating the tolerance and Variance Inflation Factor (VIF) values of the independent variables on the dependent variable. The analysis results show that all independent variables have a tolerance value greater than 0.1, and the VIF value for each independent variable is below 10. Based on these results, it can be concluded that there is no significant evidence of multicollinearity in the regression model used.

The results of the Durbin-Watson test show a value of 2.004, which is within the expected range between 1.675 and 2.362. This value indicates that the regression model does not experience autocorrelation. Thus, based on the Durbin-Watson test results, it can be concluded that there are no signs of autocorrelation in this regression model.

Tabel 3. Hypothesis Testing Results

Variable	*Coefficient*	*P-Value*
C	*8.75*	*0.00*
LEV	*2.26*	*0.03*
ME	*1.59*	*0.02*
PROF	*-0.45*	*0.08*
Adjusted R-squared	*0.51*	
F-statistic	*26.25*	
Prob (F-statistic)	*0.00*	
N	*90*	

Source: Data processed by authors using SPSS 26 (2024)

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This study reveals that the link between leverage and carbon emissions disclosure provides a deep perspective on the financial approach of companies in the face of global environmental challenges. The results of the hypothesis analysis listed in Table 3 show that leverage, measured as the debt-to-equity ratio, has a positive and significant effect on the level of carbon emissions disclosure. This indicates that companies with high levels of leverage tend to focus their attention more on debt obligations, which may reduce their commitment to carbon emissions disclosure due to having to prioritize debt repayment. In contrast, companies with low leverage have more resources that can be allocated to carbon emissions disclosure. A high level of leverage may affect firms' decisions on disclosure, as they may be reluctant to incur additional costs for disclosure that may increase their operating costs and affect their financial condition.

The significant role of the media in carbon emissions disclosure becomes clear in the context of this study, highlighting that public information plays a crucial role in promoting corporate transparency and accountability. The results of the hypothesis analysis presented in Table 3 show that media exposure has a positive and significant impact on the level of carbon emissions disclosure. This suggests that companies that are more publicized in the media tend to be more active in disclosing information about their carbon emissions. High levels of media exposure encourage companies to act more transparently and proactively in reporting carbon emissions, as public and media pressure can push companies to improve the quality of such disclosures. Conversely, companies with less media exposure may be less motivated to make more detailed disclosures about their carbon emissions.

Although profit is often considered a key factor in business decision-making, this study found that it does not apply in the context of carbon emissions disclosure in Indonesian companies. The results of the hypothesis analysis documented in Table 3 show that profitability has no significant effect on carbon emissions disclosure. This indicates that a company's profit level does not affect how much it discloses about its carbon emissions. The absence of significant differences in carbon emissions disclosure between companies with high and low profitability suggests that the decision to disclose carbon emissions information is not influenced by the company's financial performance.

When analyzed more deeply, this study reveals that the model developed is not only statistically significant, but also provides deep insight into the factors affecting carbon emissions disclosure in the Indonesian mining sector. Table 3 also lists the results of the adjusted R square analysis, which shows that independent variables such as leverage (X1), media exposure (X2), and profitability (X3) are able to explain 51.2% of the variation in the dependent variable. The remaining 48.8% is explained by other factors not included in the framework of this research model. The F statistical test results show a significance value of 0.00 <0.05, with a calculated F value of 26.25, which exceeds the critical value of the F table of 2.84. This indicates that the research model has a good fit or a good fit for this research data.

IV. CONCLUSION

In an era where social and environmental responsibility is increasingly emphasized, this study highlights how factors such as leverage, media exposure and profitability influence carbon emissions disclosure practices in the Indonesian mining sector. This study aims to examine how leverage, media exposure, and profitability affect the level of disclosure of carbon emissions in mining sector companies listed on the Indonesia Stock Exchange during the period 2018 to 2022. The study results show that the use of leverage and the level of media exposure positively and significantly affect the level of carbon emissions disclosure. In contrast, there is no evidence to suggest that profitability has a significant influence in this regard. These findings provide an important perspective for regulators in designing more effective and sustainable investment policies. Policies that encourage transparency in carbon emissions disclosure can increase the trust of stakeholders, including investors, who tend to be more prepared to invest when companies actively disclose information related to environmental risks. In addition, these findings can assist the government in drafting regulations that encourage companies to be more open in carbon emission reporting, thereby increasing transparency and trust in the stock market. From a managerial perspective, this research provides guidance for developing better corporate policies and strategies. By identifying influential stakeholders, companies can allocate resources more efficiently and effectively, and respond more appropriately to stakeholder pressures and expectations. This not only helps the company in meeting market expectations but also in strengthening its competitive position in the industry.

This research has several aspects that need to be considered. First, the dataset used is limited to mining sector companies listed on the Indonesia Stock Exchange from 2018 to 2022. Therefore, the conclusions drawn from this study may have limited relevance for other industry sectors or more recent time periods. Second, the measurement of variables such as media exposure and profitability relies on reports that may not be fully accurate or complete, which may affect the results of the analysis. Third, the use of secondary data from annual reports and sustainability reports may present uncertainties due to variations in the format and detail of the information

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available. Fourth, this study does not consider other variables that may have an effect on carbon emissions disclosure, such as internal company policies or pressure from non-governmental organizations. Finally, the limited time span of the study may not cover significant changes in policy or market conditions that could affect carbon emissions disclosure.

For future research, it is recommended to expand the scope by involving other industrial sectors as well as companies from different stock markets to increase the generalization of the results. In addition, it is recommended to use primary data collection methods or supplement secondary data with interviews or surveys to obtain more accurate information. Future research should also consider additional variables that may influence carbon emissions disclosure, as well as extend the research period to cover relevant policy changes or market conditions.

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