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FACTORS OF CARBON EMISSION DISCLOSURE BY MODERATION OF COMPANY SIZE IN MINING SECTOR COMPANIES

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Environmental Performance, Profitability, Emission Volume, Carbon Emission Disclosure, Company Size

ABSTRACT

This research aims to determine the role of environmental performance, profitability and emission volume in increasing the spread of carbon emissions by moderating company size. This research uses quantitative methods with causality and the data methods used in this research are descriptive statistics, panel data regression, classical assumption tests, hypothesis tests and coefficient of determination using Eviews 12. The population of this research is mining sector companies listed on the Stock Exchange Indonesia from 2019 to 2022. The sample was determined based on the purposive sampling method, with a sample size of 20 so that the total observations in this study were 78 observations. The data used in this research is secondary data. The data collection method uses the documentation method via the official website www.bei.co.id Hypothesis testing uses the t test. Based on the results of panel data linear regression, it shows that the influence of environmental performance with carbon emission disclosure explains that environmental performance is the company's ability to create a green and clean environment. In accordance with legitimacy theory, social relations between companies and society require companies to comply with norms that apply in society, one of which is by protecting the environment, if the company wants to gain legitimacy from society. Then company size can moderate the influence of environmental performance and emission volume on carbon disclosure. The reason company size moderates environmental performance on the disclosure of carbon emissions is that the higher the level of assets of a company, the greater or greater the disclosure of social information made by the company. So it provides a commitment to the interests of the company but must provide benefits to its stakeholders. So that partial profitability has no effect on carbon emissions disclosure, while the volume of carbon emissions has an effect on carbon disclosure.

INTRODUCTION

Carbon emissions as a global phenomenon have become one of the main environmental issues in recent years. The increase in carbon emissions, originating from greenhouse gases (GHGs) resulting from human activities, is of particular concern as it has the potential to cause global warming. This issue significantly impacts human life quality and the environment as a whole. Human survival is closely linked to climate, weather, and environmental health, all of which can influence the increase in carbon emissions in various countries.

Industrial growth in different countries, while positively impacting the global economy, also has negative consequences related to environmental degradation and increased greenhouse gas emissions. Unenvironmental-friendly human behavior, such as the exploitation of natural resources, can exacerbate environmental issues. Global issues, such as Japan's decision to dispose of nuclear waste into the sea and the impact of global warming on the ecotoxicity of seawater, highlight the complexity of environmental challenges faced by the world.

The case of hydrogen illustrates the potential for reducing global warming compared to coal gasification and methane reforming systems. The demand for renewable hydrogen and its integration into the natural gas network highlights the crucial role of renewable hydrogen production in the future. However, ecotoxicity of seawater is also a concern, caused by the use of synthetic fertilizers and fossil fuels in reforestation activities (Ramadhan et al., 2019).

Several countries, such as China and ASEAN countries, have a significant share in global carbon emissions. Indonesia, as one of the largest contributors in ASEAN, faces challenges in reducing CO2 emissions, especially from the energy and industrial sectors. The efforts of the Indonesian government, including through the National Greenhouse Gas Action Plan (RAN-GRK), reflect a commitment to addressing the impacts of global warming and climate change.

The importance of carbon emission disclosure by companies in corporate social responsibility (CSR) reports is recognized as a transparency measure for stakeholders. Despite regulations and laws governing disclosure obligations, the level of carbon emission disclosure remains low. Companies that disclose emissions are expected to benefit, such as gaining legitimacy from stakeholders and avoiding threats to reputation and legal issues.

Factors such as environmental performance, profitability, media exposure, and company size influence carbon emission disclosure. However, previous research results show variations and inconsistencies, creating an interesting research gap for further investigation. This study builds on previous research by adding company size as a moderating variable in the mining sector. In responding to various environmental issues and the challenges of global warming, further research is needed to understand the impacts and influencing factors. This study aims to contribute to our understanding of carbon emission disclosure, especially in mining sector companies, and the implications of using company size as a moderating variable.

Based on the level of carbon emission disclosure above and what has been done by previous research companies, it remains an interesting topic to be researched and continues to evolve. Therefore, the researcher is interested in finding out what factors influence carbon emission disclosure in companies. Hence, the title "Determinants of Carbon Emission Disclosure with Company Size as a Moderating Variable in the Mining Sector."

Then, in this study, there was found a difference in concept compared to previous research, which is commonly called novelty (Afni et al., 2018; Afnilia & Astuti, 2023; Astiti & Wirama, 2020). The novelty in this study is using the sector usage factor. Based on previous research, such as that conducted by (Maharani et al., 2022; Rumere et al., 2020) discussing plantation companies listed on the Indonesia Stock Exchange, and research conducted by (Susilo et al., 2022), and (Loru, 2023), discussing manufacturing companies listed on the Indonesia Stock Exchange (IDX). Then, research conducted by Ayu and Adiputra (2022) discussed companies in the Kompas 100 Index for the period February-July 2021. However, in this study, mining sector companies listed on the Indonesia Stock Exchange were used. This is because, according to Kristiaji (2023), the President of Indonesia has inaugurated the Indonesia carbon market on Tuesday, September 26, 2023, even though the carbon tax may only be implemented in 2026, so mining companies are chosen as research samples because the sector has the highest carbon emissions compared to other sectors (Melja et al., 2023).

On the other hand, based on research conducted by (Adrati & Augustine, 2022; Almaeda et al., 2023; Hariswan et al., 2022; Loru, 2023; Rooschella & Sulfitri, 2023; Rusdi & Helmayunita, 2023; Thenu et al., 2020; Zahra & Aryati, 2023)explained that in general, previous research used variables such as Company Size, which are generally independent variables, but this study used them as moderating variables (Z). The research objectives in the

results of this writing research are as follows: 1. To test and analyze the influence of Environmental Performance on Carbon Emission Disclosure in mining sector companies. 2. To test and analyze the influence of Profitability on Carbon Emission Disclosure in mining sector companies. 3. To test and analyze the influence of Media Exposure on Carbon Emission Disclosure in mining sector companies. 4. To test and analyze whether Company Size can moderate the influence of Environmental Performance on Carbon Emission Disclosure in mining sector companies. 5. To test and analyze whether Company Size can moderate the influence of Profitability on Carbon Emission Disclosure in mining sector companies. 6. To test and analyze whether Company Size can moderate the influence of Media Exposure on Carbon Emission Disclosure in mining sector companies.

RESEARCH METHOD

This research employs an associative research strategy, aiming to find relationships between two or more variables. The scientific approach in this research is rational, empirical, and systematic. The collected data are empirical and must meet validity criteria. The research method used is quantitative with a quantitative descriptive approach.

The moderating variable in this research is theoretically expected to influence the relationship between the independent and dependent variables, making it an indirect and unobservable relationship. The associative research strategy is used to evaluate the influence of determinant factors, such as Environmental Performance, Profitability, Media Exposure, and Company Size, on Carbon Emission Disclosure, both partially and simultaneously.

The research population includes mining sector companies listed in the Manufacturing Index for the years 2019-2022 and listed on the Indonesia Stock Exchange, totaling 41 companies. The sample is taken using purposive sampling techniques, with criteria including companies listed in the mining sector index for four consecutive years, using the Rupiah currency in their financial reports, and having submitted audited annual financial reports accompanied by independent auditor reports.

The data in this study are classified into two types: primary data and secondary data. Primary data are obtained through online questionnaires, while secondary data come from company records, government publications, and online sources. The data collection method used is documentation, focusing on the financial statements and sustainability reports of mining sector manufacturing companies. The operational definition of variables and their measurement scales includes independent variables such as Environmental Performance, Profitability, and Media Exposure, as well as the dependent variable, Carbon Emission Disclosure. Carbon emission disclosure is measured by an index covering various aspects such as climate change, greenhouse gas emissions, energy consumption, greenhouse gas cost and reduction, and carbon emission accountability. The moderating variable, Company Size, is measured by the total assets of the company. Variable operationalization is done through indicators that form them, such as the PROPER rating for Environmental Performance, Return On Asset for Profitability, and media exposure assessment for Media Exposure. Research data were obtained from 20 mining sector companies during the period 2019-2022, with a total of 80 observations.

This research uses data analysis and hypothesis testing methods, involving descriptive statistical analysis and panel data regression with Common Effect, Fixed Effect, and Random Effect models. Model selection is based on the Chow test, the Hausman test, and the Lagrange

Multiplier test. Classical assumptions are tested through tests of normality, multicollinearity, autocorrelation, and heteroskedasticity.

Multiple regression analysis uses a multiple linear model with independent variables such as Environmental Performance, Profitability, and Media Exposure, as well as the moderating variable Company Size. Partial statistical tests (t-test) and simultaneous statistical tests (F-test) are used to evaluate the influence of independent variables. The coefficient of determination (R2) measures how well the model can explain the variability of the dependent variable.

Model fit tests are conducted using Average Path Coefficient, Average R-Square, and Average Variance Inflation Factor. The problem-solving framework is used as a guide in the preparation, data collection, and data analysis stages, ensuring the effectiveness and efficiency of the research.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistical analysis in this study is to provide an overview or description of each research variable, namely Environmental Performance, Profitability, Emission Volume as an independent variable and disclosure of carbon emissions as a dependent variable and company size as a control variable in this study. Descriptive statistics show the *minimum*, *maximum*, *mean* and standard deviation. The descriptive statistics of each variable studied are as follows:

Table 1 Descriptive Statistical Tests

	CED	KL	PF	VE	UK
Mean	0.870128	3.833333	0.061571	1019690.	30.80113
Median	0.890000	4.000000	0.050806	442275.5	30.74161
Maximum	1.000000	5.000000	0.296974	5420173.	32.76456
Minimum	0.780000	3.000000	-0.098395	3646.000	27.49350
Std. Dev.	0.060892	0.812510	0.075185	1230458.	1.123466
Skewness	-0.139689	0.311372	1.349622	1.788862	-0.570637
Kurtosis	2.489813	1.599409	5.214080	5.998518	3.714898
Jarque-Bera	1.099616	7.635765	39.61122	70.82146	5.894158
Probability	0.577061	0.021974	0.000000	0.000000	0.052493
Sum	67.87000	299.0000	4.802521	79535808	2402.488
Sum Sq. Dev.	0.285499	50.83333	0.435262	1.17E+14	97.18746
Observations	78	78	78	78	78

Source: Data processed, 2023

Based on Table 6, it discusses descriptive statistical tests by explaining that in the carbon disclosure value, the descriptive statistical testing results show a mean value of 0.870128, then a median value of 0.89, with a maximum value of 1 and a minimum value of 0.78. For the environmental performance variable, it has a mean value of 3.83333, a median value of 4.00, and a maximum value of 5 for PT Adaro Energy Indonesia, PT Elnusa, PT Perusahaan Gas

Negara consecutively from 2019 to 2022. In 2020, only PT Aneka Tambang, PT Indika Energy, and PT Vale Indonesia achieved a score of 5. Furthermore, only Bumi Resource had a proper point 5 in 2020 to 2022, with a minimum value of 3. For the emission volume variable, it has a mean value of 1,019,690, a median value of 444,275.5, with a maximum value of 5,420,173 held by PT Vale Indonesia in 2019 and a minimum value of 3,636 held by PT Energi Mega Persada in 2022.

Regarding the profitability variable, it has a mean value of 0.061571, a median value of 0.050806. The maximum value is 0.296974 held by PT Indo Tambangraya Megah in 2021, and the minimum value is -0.098395 held by PT Aneka Tambang in 2020. For the company size variable, it has a mean value of 30.801113, a median value of 30.74161. The maximum value is 32.76456 held by PT Adaro Energy Indonesia in 2021, and the minimum value is 27.49350 held by PT TBS Energi Utama in 2021.

Classic Assumption Test

Normality Test

In the normality test phase of this research, it was conducted using the histogram graphic method and the Jarque-Bera (JB test) statistical test. The normality test aims to assess whether the variable model used in regression has a normal distribution or not. Normal distribution in regression data is considered important to ensure the reliability of the model. The results of this normality test are evaluated with two criteria as follows: first, if the Jarque-Bera probability value is greater than 0.05 (5%), it can be concluded that the data is normally distributed. Conversely, if the Jarque-Bera probability value is less than 0.05, then the data is considered not normally distributed.

The Jarque-Bera probability value obtained is 0.518531. By comparing this value with the threshold of 0.05, i.e., 0.518531 > 0.05, it can be concluded that the analyzed data is normally distributed. Therefore, the data used in this research meets the assumption of normal distribution for the variable model used in regression analysis. Figure 2 also indicates the data source processed by the author in the year 2023.

Multicollinearity Test

The multicollinearity test is conducted to evaluate the regression model and detect potential correlations between independent variables. Multicollinearity issues arise when there is a strong correlation between two or more independent variables in a regression model. The criterion used in the assessment is if the correlation value between variables exceeds 0.80, indicating multicollinearity problems.

The results of the multicollinearity test show correlation values between independent variables: environmental performance (KL), emission volume (VE), profitability (PF), and company size (UK). Based on the analysis, it can be concluded that these independent variables do not show multicollinearity problems as they have correlation values below 0.80. Specifically: a. The correlation between environmental performance and emission volume is 0.253253, indicating the absence of multicollinearity issues. b. The correlation between environmental performance and profitability is 0.137204, indicating the absence of multicollinearity issues. c. The correlation between emission volume and profitability is -0.137204, indicating the absence of multicollinearity issues.

Thus, the results of the multicollinearity test indicate that independent variables involving environmental performance, emission volume, profitability, and company size can

be considered free of multicollinearity problems in the regression model. This table represents the data processing results by the author in the year 2023.

Heteroskedasticity Test

The heteroskedasticity test is conducted to assess the non-uniformity of residual variance between observations in the regression model. In this study, the heteroskedasticity test uses the White method, and the results are recorded in Table 8. The table analysis shows that the F-statistic probability value is higher than 0.05 (1.1261), indicating the absence of heteroskedasticity symptoms in the regression model.

Furthermore, autocorrelation testing is performed to determine whether there is a correlation between disturbance errors in period t and period t-1 in the linear regression model. The Durbin-Watson method is used, and the results are listed in Table 9. Analysis based on Table 10 shows that the Durbin-Watson value of 0.360259 indicates the absence of positive autocorrelation symptoms in the regression model. In conclusion, the autocorrelation test results confirm the absence of positive autocorrelation, and the decision is accepted in the regression model in this study.

Panel Data Regression Model Selection

Based on the results of panel data regression model selection carried out through lagrange *multiplier test*, chow test and hausman test. So it can be concluded that the panel data regression estimation method used is as follows:

Table 2 Model Selection Test Conclusion Results

No	Method	Test	Result
1	*Lagrange Multiplier Test*	*Random Effect vs Common Effect*	*Common Effect*
2	*Chow Test*	*Common Effect vs Fixed Effect*	*Common Effect*
3	*Hausman Test*	*Random Effect vs Fixed Effect*	*Random Effect*

Source : data processed by researchers, 2023

The results of the panel data regression model selection test for the three panel data models above aim to strengthen the conclusion of the panel data regression estimation method used. Based on the table above, it can be concluded that the panel data regression model used is *the Common Effect Model* (CEM) to analyze the data in this study.

Panel Data Regression Analysis

Regression analysis of panel data aims to examine how influential independent variables consisting of environmental performance, emission volume, profitability, and company size are on the disclosure of carbon emissions as dependent variables with several companies as samples over several periods of time.

Based on the results of the panel data regression test, there is a panel data regression equation as follows :

CED = 0.879074 + –0.274590 KL + 0.785382 PF + 4.04 VE + 0.008634 KL_UK + -0.023586 PF_UK + -1.23 VE_UK + $\mathcal{E}$

From the equation of the panel data regression model above, it can be explained as follows:

1. The constant value of the regression equation model is 0.879074, which means that if the values of the environmental performance, profitability, emission volume, and company size variables are considered constant or equal to 0, then the carbon emission disclosure is 0.879074.

2. The regression coefficient for the environmental performance variable is -0.274590, meaning that if environmental performance increases by 1%, the carbon emission disclosure will decrease by -0.274590%, assuming the variables are environmental performance, profitability, emission volume, and company size.
3. The regression coefficient for the profitability variable is 0.785382, meaning that if profitability increases by 1%, the carbon emission disclosure will decrease by 0.785382%, assuming the variables are environmental performance, profitability, emission volume, and company size.
4. The regression coefficient for the carbon emission volume variable is 4.04, meaning that if carbon emission volume increases by 1%, the carbon emission disclosure will decrease by 4.04%, assuming the variables are environmental performance, profitability, emission volume, and company size.
5. The regression coefficient for the company size variable moderating environmental performance is 0.008634, meaning that if the company size moderates environmental performance by 1%, the carbon emission disclosure will decrease by 0.008634%, assuming the variables are environmental performance, profitability, emission volume, and company size.
6. The regression coefficient for the company size variable moderating profitability is -0.023586, meaning that if the company size moderates profitability by 1%, the carbon emission disclosure will decrease by -0.023586%, assuming the variables are environmental performance, profitability, emission volume, and company size.
7. The regression coefficient for the company size variable moderating carbon emission volume is -1.23, meaning that if the company size moderates carbon emission volume by 1%, the carbon emission disclosure will decrease by -1.23%, assuming the variables are environmental performance, profitability, emission volume, and company size.

Hypothesis Testing

Testing this hypothesis is carried out with the aim of finding out whether the independent variable can affect the dependent variable. In this study the steps used in hypothesis testing are as follows:

Effect Test (Test t)

Hypothesis testing in this study aims to determine whether independent variables such as environmental costs, *green innovation*, investment decisions and profitability can affect the dependent variable, namely individual company value. The following is the result of the t-test calculation.

Table 3 Effect Test Results (Test t)

Dependent Variable: CED
Method: Panel Least Squares
Date: 12/28/23 Time: 22:54
Sample: 2019 2022
Periods included: 4
Cross-sections included: 20
Total panel (unbalanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.879074	0.033260	26.43076	0.0000
KL	-0.274590	0.075468	-3.638511	0.0005
PF	0.785382	1.888058	0.415973	0.6787
VE	4.043222	1.914038	2.112404	0.0382
KL_UK	0.008634	0.002333	3.700640	0.0004
PF_UK	-1.233474	6.022103	-2.048245	0.0442
VE_UK	-0.023586	0.061156	-0.385671	0.7009

Root MSE	0.048784	R-squared	0.349815
Mean dependent var	0.870128	Adjusted R-squared	0.294870
S.D. dependent var	0.060892	S.E. of regression	0.051132
Akaike info criterion	-3.023361	Sum squared resid	0.185627
Schwarz criterion	-2.811862	Log likelihood	124.9111
Hannan-Quinn criter.	-2.938694	F-statistic	6.366624
Durbin-Watson stat	0.360259	Prob(F-statistic)	0.000021

Source: Data processed, 2023

Based on Table 19, the hypothesis testing in this research aims to determine whether the independent variables, namely environmental performance, profitability, and emission volume, can influence the dependent variable, carbon emission disclosure, with the moderating variable being the company size individually. This test is conducted with a significance level of 0.05 (α = 5%) and a comparison between the t-test and the t-table. In this study, the number of observations is 78 (n=78), the independent variables amount to 6 (k = 6), and the significance level is 0.05. Therefore, the t-table can be determined with df = (α/2; n-k-1) = 0.025;78-6-1 = 0.025;71. Thus, based on the t-table, the value obtained is 1.66660. Based on the t-table value, the results can be explained as follows:

Hypothesis Testing One (H1)

The regression coefficient for the environmental performance variable is 0.274590, and it obtains a t-value of -3.638511 with a probability value (significance level) of 0.0005. Therefore, -3.638511 > 1.66660, meaning that the t-value > t-table with a probability value (significance level) of 0.0005 < 0.05. Thus, H0 is rejected, and H1 is accepted. It can be concluded that the environmental performance variable negatively affects carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Hypothesis Testing Two (H2)

The regression coefficient for the profitability variable is 0.785382, and it obtains a t-value of 0.415973 with a probability value (significance level) of 0.6787. Therefore, 0.415973 < 1.66660, meaning that the t-value < t-table with a probability value (significance level) of 0.6787 > 0.05. Thus, H0 is accepted, and H1 is rejected. It can be concluded that the profitability variable does not affect carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Hypothesis Testing Three (H3)

The regression coefficient for the carbon emission volume variable is 4.043223, and it obtains a t-value of 2.1124 with a probability value (significance level) of 0.0382. Therefore, 2.1124 > 1.66660, meaning that the t-value > t-table with a probability value (significance level) of 0.0382 < 0.05. Thus, H0 is rejected, and H1 is accepted. It can be concluded that the

carbon emission volume variable affects carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Hypothesis Testing Four (H4)

The regression coefficient for the environmental performance variable moderated by the company size is 0.008634, and it obtains a t-value of 3.70064 with a probability value (significance level) of 0.0382. Therefore, 3.70064 > 1.66660, meaning that the t-value > t-table with a probability value (significance level) of 0.0382 < 0.05. Thus, H0 is rejected, and H1 is accepted. It can be concluded that the company size can moderate environmental performance to affect carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Hypothesis Testing Five (H5)

The regression coefficient for the profitability variable moderated by the company size is 1.233474, and it obtains a t-value of -2.048245 with a probability value (significance level) of 0.0442. Therefore, -2.048245 > 1.66660, meaning that the t-value < t-table with a probability value (significance level) of 0.0442 < 0.05. Thus, H0 is rejected, and H1 is accepted. It can be concluded that the company size can moderate profitability to negatively affect carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Hypothesis Testing Six (H6)

The regression coefficient for the carbon emission volume variable moderated by the company size is 0.023586, and it obtains a t-value of -0.385671 with a probability value (significance level) of 0.7009. Therefore, -0.385671 < 1.66660, meaning that the t-value > t-table with a probability value (significance level) of 0.7009 > 0.05. Thus, H0 is accepted, and H1 is rejected. It can be concluded that the company size cannot moderate the volume of emissions to affect carbon emission disclosure in the sector companies in Indonesia from 2019 to 2022.

Coefficient of Determination (R2)

This coefficient of determination is to measure the percentage of influence between independent variables on the dependent variable. In this study the percentage of influence of environmental performance profitability, volume of emissions moderated by company size to company value based on the coefficient of determination (R2) as follows:

Table 4 Results Coefficient of determination

Root MSE	0.048784	R-squared	0.349815
Mean dependent var	0.870128	Adjusted R-squared	0.294870
S.D. dependent var	0.060892	S.E. of regression	0.051132
Akaike info criterion	-3.023361	Sum squared resid	0.185627
Schwarz criterion	-2.811862	Log likelihood	124.9111
Hannan-Quinn criter.	-2.938694	F-statistic	6.366624
Durbin-Watson stat	0.360259	Prob(F-statistic)	0.000021

Source : data processed by researchers, 2023

Based on Table 20 above, the results of the coefficient of determination (R2) test show that the Adjusted R-squared value is 0.294870 which means 29.487% of carbon emission disclosure can be explained by environmental performance, profitability, volume of carbon emissions with moderated company size. While the remaining 70.513% was explained by other variables that were not included in this research model.

Discussion of Research Results

Based on hypothesis testing that has been done using independent variables (Environmental Performance, Profitability, Energy Volume), bound variables (Carbon Emission Disclosure) and moderation variables (Company Size) with *Eviews* 12 software using panel data so that the best model that has been determined is the *Common Effect Model*. The following is a discussion of the results of research that has been carried out on each variable so that it can be explained as follows:

The Effect of Environmental Performance on Carbon Emission Disclosure

Based on table 19 explains that the regression coefficient for environmental performance variables is 0.274590 and obtained a calculated value of -3.638511 with a probability value (significance level) of 0.0005. So that -3.638511 > 1.66660 which means tcalculate > ttable with a probability value (significance level) of 0.0005 < 0.05, H0 is rejected and H1 is accepted, so it can be concluded that environmental performance variables negatively affect the disclosure of carbon emissions in sector companies in Indonesia in 2019-2022. This can be interpreted as environmental performance is the company's ability to create a green and clean environment. According to legitimacy theory, social relations between companies and communities require companies to comply with norms that apply in society, one of which is by protecting the environment, if companies want to gain legitimacy from the community (Hamdiyani, 2023).

So that environmental performance is considered as an active strategy against environmental problems faced, such as strategies for measuring and managing carbon footprints in dealing with carbon emission problems produced by the company. So as to provide public trust in the company, so that the community and related parties and provide an increase in the company 's image (Maulidiavitasari and Yanthi, 2021). So that in accordance with the theory of Stakeholders can provide relationships between a business entity and a group or individual who influence each other so that these problems can be quickly resolved (Ardiyasa, 2021). And supported by research conducted by the statement above supported by research conducted by Jannah and Narsa (2021), Rusli (2019), Loru (2022), Ayu and Adiputra (2022), Susilo et al,. (2022). However, the statements described above contradict the results of research conducted by Amaliyah and Sholikha (2019), Apriliana, et al,. (2019), Inawati and Taufiqi (2022), Ulfa and Khomsiyah (2023).

The Effect of Profitability on Carbon Emissions Disclosure

Based on table 19, it is explained that the regression coefficient for the profitability variable is 0.785382 and obtained a calculated value of 0.415973 with a probability value of 0.6787. So that 0.415973 < 1.66660 which means tcalculate < ttable with a probability value (significance level) of 0.6787 > 0.05, then H0 is accepted and H1 is rejected so that it can be concluded that the profitability variable has no effect on the disclosure of carbon emissions in sector companies in Indonesia in 2019-2022.

So that profitability is considered unable to be a reference for reflecting the ability of a company to obtain profits or profits and cannot be used as a measure of the effectiveness of

company management management. companies that have high profitability explain that the company manages its wealth effectively and efficiently in obtaining profits every period (Dewi, et al., 2021). And profitability cannot ensure that not necessarily the better the financial performance of a company, the company has the financial ability to incorporate carbon emission reduction strategies into its business strategy (Setiadi, 2021).

This is not in line with the stakeholder theory of profitability which explains that the larger a company, the more parties will become part of the company's stakeholders, so that the company will experience an increase in terms of investment or an increase in capital. Companies with high profits, shareholders (*stakeholders*) will invest in the company, so that the company is considered good by investors (Melja, et al., 2023). The results of this study are supported by Arwangga and Raharja (2023), Sekarini and Setiadi (2021), Wirawan and Setijaningsih (2022), Asmeri et al,. (2022), Larasati, et al,. (2020). But contrary to the results of research conducted by Nastiti and Hardiningsih (2022), Hamdiyani (2023), Puspita and Tanjaya (2022), Dewi and Aldhan (2021), Putri, et al,. (2022), Wibowo, et al,. (2022), Tana and Diana (2021).

The Effect of Environmental Carbon Emission Volume on Carbon Emission Disclosure

Based on table 19, it is explained that the regression coefficient for the variable volume of carbon emissions is 4.043223 and obtained a calculated value of 2.1124 with a probability value of 0.0382. So that 2.1124 > 1.66660 which means tcalculate > ttable with a probability value of 0.0382 < 0.05, H0 is rejected and H1 is accepted so that it can be concluded that the variable volume of carbon emissions affects the disclosure of carbon emissions in sector companies in Indonesia in 2019-2022.

So that the volume of carbon emissions is a gas that arises when materials containing carbon are burned. Efforts that companies can make to reduce greenhouse gases include disclosing carbon emissions. Disclosure of these emissions by disclosing the volume quantity of each type of carbon emissions. In addition, in accordance with signal theory which provides an explanation of the types of carbon emissions, companies are classified into three scopes, namely direct GHG emissions, indirect GHG emissions derived from electricity and other indirect GHG emissions.

In line with this, in line with *signalling theory* which shows that disclosure of carbon emission volumes becomes bad news for disclosing companies. The greater the volume revealed by the company, the more negative the company's performance. The results of research conducted by Afnilia and Astuti, (2023) and Sudibyo, (2018) explained that the results in this study the volume of carbon emissions in Indonesia are voluntary disclosures so it is difficult to find information about carbon emissions in sustainability reports and annual reports. However, the results of this study are contrary to those conducted by Adrati and Augustine, (2022).

Influence of Company Size in Moderating Environmental Performance on Carbon Emission Disclosure

Based on Table 19, it is explained that the regression coefficient for the environmental performance variable moderated by company size is 0.008634, obtaining a t-value of 3.70064 with a probability value (significance level) of 0.0382. Therefore, since 3.70064 > 1.66660, meaning that the t-value > t-table with a probability value of 0.0382 < 0.05, H0 is rejected, and H1 is accepted. It can be concluded that the company size variable can moderate environmental

performance to influence carbon emission disclosure in the sector companies in Indonesia from 2019-2022.

Hence, the influence of company size on carbon emission disclosure explains that companies with good financial conditions will be able to allocate additional human and machine resources needed to make high carbon emission disclosures to withstand external pressures (Wiratno and Muaziz, 2020). Then, the impact of size on environmental performance is that companies with high assets can interact with their environment by utilizing high resources to obtain maximum assets as well (Ramanathan, 2018). Therefore, companies need to pay attention to the environment because the existence of a company will be recognized by society if the company has a positive impact on its environment, which will further enhance the company's image and positive image in the eyes of the public (Khasanah and Oswari, 2018).

Thus, in accordance with stakeholder theory, which explains that the survival of an organization depends on the support of stakeholders, the company's activities are aimed at seeking such support. One strategy to maintain relationships with stakeholders is by disclosing a sustainability report covering economic, social, and environmental aspects and being able to maintain the company's profit stability (Ardiyasa, 2021).

The disclosure of a sustainability report and maintaining the company's profit stability are expected to meet the desires of stakeholders, resulting in a harmonious relationship between the company and stakeholders, thus enabling the organization to achieve sustainability in the future. Information provided by companies about their condition, such as the volume of carbon emissions due to the company's operational activities, is essential for the company's sustainability and the interests of stakeholders. This stakeholder theory also indicates the existence of a company because the stronger the stakeholder position, the greater the tendency for the company to adjust its position to stakeholder desires (Adrati and Augustine, 2022). This is supported by Widiyani and Meidawati (2023), Zahra and Aryati (2023), Almaeda et al. (2023), Rooschella and Sulfitri (2023), Rusdi and Helmayunita (2022), Maharani et al. (2022), Hariswan et al. (2022). However, this explanation contradicts Septriyawati and Anisah (2019), Astiti and Wirama (2020), Nastiti and Hardiningsih (2022), Melja et al. (2023), Ramadhan et al. (2021).

Influence of Company Size in Moderating Profitability on Carbon Emission Disclosure

According to Table 19, it is explained that the regression coefficient for the profitability variable moderated by company size is 1.233474, obtaining a t-value of -2.048245 with a probability value (significance level) of 0.0442. Therefore, since -2.048245 > 1.66660, meaning that the t-value < t-table with a probability value of 0.0442 < 0.05, H0 is rejected, and H1 is accepted. It can be concluded that the company size variable can moderate profitability to have a negative impact on carbon emission disclosure in the sector companies in Indonesia from 2019-2022.

The reason company size moderates profitability on carbon emission disclosure is that the size of the company can provide strength in increasing profits. Whether small or large, a company ensures that it can utilize funds to manage the carbon emissions generated by the company. Therefore, large-scale companies are certainly better at financial management compared to small-scale companies (Rooschella and Sulfitri, 2023).

In line with the relationship between legitimacy theory and profitability, if a company has high profitability, it will increase the company's concern for environmental issues. In implementing environmental social responsibility, a company must align with existing social

values (Anjarsari, et al., 2023). It can be interpreted that large companies will disclose more information than small companies because large companies tend to have a higher risk of social environmental damage (Rusdi and Helmayunita, 2023). This discussion aligns with Widiyani and Meidawati (2023), Zahra and Aryati (2023), Almaeda et al. (2023), Rooschella and Sulfitri (2023), Rusdi and Helmayunita (2022), Maharani et al. (2022), Hariswan et al. (2022). However, this discussion contradicts Septriyawati and Anisah (2019), Astiti and Wirama (2020), Nastiti and Hardiningsih (2022), Melja et al. (2023), Ramadhan et al. (2021).

Influence of Company Size in Moderating Emission Volume on Carbon Emission Disclosure

Based on Table 19, it is explained that the regression coefficient for the carbon emission volume variable moderated by company size is 0.023586, obtaining a t-value of -0.385671 with a probability value (significance level) of 0.7009. Therefore, since -0.385671 < 1.66660, meaning that the t-value > t-table with a probability value of 0.7009 > 0.05, H0 is accepted, and H1 is rejected. It can be concluded that the company size variable cannot moderate emission volume to have an impact on carbon emission disclosure in the sector companies in Indonesia from 2019-2022.

The explanation of company size as a moderator is because company size, with carbon emission disclosure, explains that the size of the company depicts the magnitude, shown by total assets, sales figures, average total sales, and average total assets. Therefore, company size is a measure of the magnitude of assets owned by the company (Maharani et al., 2022). Then, through the explanation of carbon emission volume, stakeholders cannot yet assess the company's role in reducing greenhouse gas emissions (GHG) and as a form of the company's environmental concern. Therefore, the company's efforts to reduce carbon emissions with carbon accounting are in line with the concept of CSR (Corporate Social Responsibility) (Afnilia and Astuti, 2023). This is supported by research conducted by Afnilia and Astuti (2023), explaining that companies tend not to disclose carbon emissions because implementing an internal measurement system and carbon emission processes require high costs. This is supported by regulations in Indonesia that do not yet mandate companies to disclose carbon emissions in sustainability or annual reports. This statement is supported by research conducted by Sudibyo (2018).

CONCLUSION

From the explanation above, it can be concluded that the environmental performance variable influences carbon emission disclosure in mining sector companies during the period 2019-2022. Environmental performance reflects the company's ability to create a clean and green environment, in line with legitimacy theory, which requires companies to comply with societal norms to obtain legitimacy. The profitability variable does not affect carbon emission disclosure, indicating that profitability is not an indicator of management effectiveness in companies. Carbon emission volume affects disclosure, indicating that companies are making efforts to address carbon emission issues by disclosing their quantity. Company size moderates environmental performance, influencing carbon emission disclosure, and moderates profitability to affect carbon emission disclosure. Recommendations for companies include paying attention to sustainability reports that can influence profits, while investors are advised to consider factors influencing carbon emission disclosure. Further research is expected to

broaden the scope and variables of the study, address data limitations, and engage in methodological developments.

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