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The Effect of Disclosure of Carbon Emissions, Environmental Performance and Environmental Costs on Firm Value

(Empirical Study of Coal Mining Companies on the IDX 2019-2021)

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Abstract: This study aims to determine the effect of disclosure of carbon emissions, environmental performance and environmental costs on firm value. This study uses secondary data in the form of information taken from the company's financial statements or annual reports. This study uses 18 companies in the coal mining sector listed on the IDX in 2019-2021. The sampling technique used purposive sampling based on certain criteria so that 18 companies were selected as research samples. Hypothesis testing in this study used multiple regression analysis using SPSS software. The results of this study indicate that the variables of carbon emissions and environmental performance have no effect on firm value. While environmental costs have a significant effect on firm value.

Keywords: Carbon Emissions, Environmental Performance, Environmental Costs, Firm Value

1. Introduction

The global issue is a phenomenon that has become a concern in recent years. This issue is in the form of global warming, which is increasingly visible from the increase in air temperature in the atmosphere. This results in climate change and the influence of carbon dioxide (CO2), which has a negative impact on the surrounding environment. In simple terms, carbon emission is carbon dioxide gas that is released to the earth. Some air emissions will be absorbed back into the sea and not much is absorbed due to the limited ability of land and oceans. The impact of carbon emissions has caused all countries to experience a transformation of the earth's climate, which has caused concern (Pranasyahputra et al., 2020).

Current condition, environmental degradation is a threat to society, especially in Indonesia. Carbon emissions have negative impacts, especially on health and economic issues. In overcoming environmental damage, sustainable development is one of the ways that the government must do to prevent global warming and reduce carbon emissions. (Faisal & Sofyan, 2018).

The highest case of carbon emissions in Indonesia occurred in Riau due to forest and land fires in 15,422 hectares of forest, producing 12 million tonnes of carbon emissions. Data from the Ministry of Environment stated that in 2020, carbon emissions reached 12,422,966 tonnes, showing an increase in the number of emissions in 2017(Febri, 2021). The negative consequences of company operations are caused by wasteful energy and carbon utilisation, which is a concern of the wider community regarding the issue of environmental change. The occurrence of this environmental damage, companies must be transparent in disclosing carbon emissions and care for the environment. Disclosure of carbon emissions is regulated in the Law on Limited Liability Companies (PT) No.40 of 2007 article 66c submitting annual reports regulated in OJK circular No. 30 / SEOJK.04 / 2016 the obligation of issuers or public companies to include social and environmental responsibility reports in annual reports or sustainability reports. Therefore, the company must incur large costs in mitigating the triggers of existing environmental problems.

Firm value is one of the considerations for investors to make investment decisions because firm value represents the ideal of a market in assessing the company as a whole. When a stock increases, shareholders can benefit maximally. Firm value is the investor's interpretation of the size of the company's success with the stock price.(Amro & Asyik, 2021)According toMujiyati et al., (2022)indicates that firm value can be increased by the tax amnesty provided by the government.

2. Literature Review and Hypothesis

2.1 Stakeholder Theory

Stakeholder theory is a theory that explains the relationship that occurs between companies and stakeholders so as to make companies open to the company's overall business activities (Amaliyah & Solikhah, 2019). The key to establishing relationships with stakeholders is by disclosing Sustainability Reports regarding environmental, social, and environmental performance to company stakeholders. Motivation in improving a

good environment can improve the company's existence. According to Ulum & Ahmad (2016)explained that every company activity provides benefits to stakeholders regarding the company's overall information such as sponsorship, pollution, security initiatives. The role of the community in maintaining environmental activities as well as the way quality performance is also influential in improving the reputation of the company's name.

2.2 Signal Theory

Signalling theory emphasises internal information from companies that is not published to the public in a relevant and intensive manner. Investors will give positive signals regarding disclosure of environmental information such as sustainability reports, with disclosure of environmental information, investors have more confidence in sustainability(Kelvin et al., 2017). The disclosure of the company's annual report will respond to the interest of investors and the public. Corporate Environmental Disclosure is a corporate social responsibility (CSR) activity that provides strong signals to the company's environment so as to improve environmental management. (Hapsoro & Adyaksana, 2020)

2.3 The Effect of Carbon Emissions Disclosure on Firm Value

Emissions disclosure is an activity in the supplementary report that has been listed in the legislation that describes the company's contribution to environmental change by disclosing transparency and accountability regarding the annual report (Rusmana et al., 2020). In developing a business, it is important for companies to pay attention to the surrounding environment which is related to the cultural customs of the local community (Nastiti et al., 2022). According to, Ulum et al., (2020)explains that each company activity provides benefits to stakeholders regarding overall company information such as sponsorship, pollution, security initiatives.
H1: Carbon emissions affect firm value

2.4 The Effect of Environmental Performance on Firm Value

Environmental performance is a form of company involvement to contribute to maintaining and protecting the environment (Rusmana et al., 2020). Environmental performance is carried out as a form of concern in protecting and preserving the environment. According to Artamelia et al., (2021), The purpose of PROPER is to encourage industries to implement green economy principles while complying with environmental regulations. Stakeholders want companies to be socially responsible with the environment and able to improve environmental performance as a stakeholder requirement(Lu & Taylor, 2018). The existence of a good environment and good environmental performance provides company value to be of interest to investors, this has an impact on the company's image to increase company value.
H2: Environmental Performance affects Firm Value

2.5 The Effect of Environmental Costs on Firm Value

From the signal theory, investors will give positive signals related to disclosure of environmental information such as sustainability reports, with disclosure of information about the environment, investors have more confidence in sustainability(Kelvin et al., 2017). Environmental cost reduction is applied by companies in order to mitigate the damage caused. So that the company applies concern for the environment.
H3: Environmental costs affect the value of the Company.

3. Methodology and Procedures

3.1 Population and Sample

In this study, the population used is mining companies listed on the IDX in 2019-2021. The sampling technique used in this study is using Purposive Sampling, which is a method of determining the sample using certain criteria.

Table 1 Population and Sample

Required Criteria	**Total**
Mining Sector Companies listed on the IDX 2019-2021	63
New coal mining companies that are not listed in 2019-2021	(30)
Mining companies that do not publish financial statements 2019-2021	(3)
Companies that are not included in the Performance Rating Assessment Programme (PROPER)	(12)
Companies that do not consistently publish carbon emission disclosures in their annual report	0
Total Company	18
Total sample (n x Periode Sampel) (18x3)	54

Outlier Data	(7)
Research Sample	47

Source: Proses Data 2023

In this study, hypothesis testing uses multiple regression hypotheses. Multiple hypothesis testing is a statistical technique used to determine whether there is a relationship between several independent variables and one dependent variable.

$$\mathbf{PBV = \alpha + \beta 1CED + \beta 2KL + \beta 3BL + \varepsilon}$$

3.2 Company Value

In this study, researchers decided to use Price to Book Value (PBV) as an indicator of firm value because investors often use price book value to make investment decisions (Bragham & Houston, 2013).

$$\mathbf{PBV = \frac{Share\ Price}{Book\ Value}}$$

3.3 Carbon emissions disclosure

Carbon emission disclosure is shareholders' perception of the transparency of the annual report issued by the company regarding the company's efforts to address environmental impacts (Rusmana et al., 2020).

Table 2 Disclosure of carbon emissions

Climate Change - Risks and Opportunities	CC1 - Assessment based on interconnected risks to climate change and actions taken to address risks. CC2 - Current and future assessments based on the business, financial and opportunity implications of a changing climate.	**Bae Choi & Psaros, 2013**
GHG Emissions Calculation	GHG1 - Description of the methodology used for GHG emissions calculations. GHG2 - Existence of externally obtained verification of GHG emissions measurement. . GHG3 - Number or total of calculations produced. GHG4 - Disclosure of scope 1, 2 or 3 GHG emissions. GHG5 - GHG emissions source disclosure. GHG6 - Facility disclosure of GHG emissions. GHG7 - Comparison with GHG emissions in the previous year..	
Energy Consumption	EC1 - Amount of energy consumed. EC2 - Quantification of energy used from renewable sources EC3 - Disclosure of type and segment	
Cost Estimates and GHG Reductions	RC1 - Detailed strategy to reduce GHG emissions. RC2 - Specifications qualifying the target levels and years of carbon emission reductions. RC3 - Emissions reductions and the costs or savings achieved as a result of the carbon emissions reduction plan. RC4 - Costs stemming from future emissions costs that have been accounted for in capital expenditures.	
Carbon Emissions Accountability	ACC1 - Indication of the Board Committee responsible for climate-related actions. ACC2 - Description of the mechanism by which the Board reviews the company's progress on climate change	

3.4 Environmental performance

Environmental performance is a form of company involvement to contribute to maintaining and protecting the environment so that it has an impact on natural resources (Rusmaningsih dan Setiadi 2021).

Tabel 3 Pemeringkatan PROPER

Colour	**Meaning**	**Scale**
Black	Very Bad	1
Red	Bad	2
Blue	Good	3

Green	Very Good	4
Gold	Very good	5

Source: (Suhardi dan Purwanto, 2015)

3.5 Environmental costs

Environmental costs as sacrifices incurred by companies related to damage and as an effort to protect the environment in business practices. According toHadi (2011), to calculate the environmental cost, it is formulated:

$$\textbf{Environmental costs} = \frac{\textbf{Cost}}{\textbf{Profit}}$$

3.6 Data Analysis Technique

In this study, hypothesis testing uses multiple regression hypotheses. Multiple hypothesis testing is a statistical technique used to determine whether there is a relationship between several independent variables and one dependent variable.

$$\mathbf{PBV = \alpha + \beta 1CED + \beta 2KL + \beta 3BL + \varepsilon}$$

4. Result and Discussion

4.1 Analisis Statistik Deskriptif
Descriptive Statistical Analysis

Tabel 4 Hasil Analisis Deskriptif

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Carbon Emissions Disclosure	47	0,33	0,72	0,5473	0,12794
Environmental Performance	47	3	5	3,851	0,7512
Environmental Costs	47	-1,89	552,18	36,1586	118,80170
Company Value	47	0,13	3,00	1,1549	0,71672

Based on table 4, it is known that the Carbon Emissions Disclosure variable has a minimum value of 0.33, and has a maximum value of 0.72. This shows that the value of Carbon Emissions Disclosure ranges from 0.33 to 0.72 with an average value of 0.5473 and with a standard deviation value of 0.12794. The Environmental Performance variable has a minimum value of 3 and a maximum value of 5. This shows that the value of Environmental Performance ranges from 3 to 5 with an average value of 3.851, and with a standard deviation value of 3.851. The Environmental Cost variable has a minimum value of -1.89 and has a maximum value of 552.18. This shows that the value of environmental costs ranges from -1.89 to 552.18, and has an average value of 36.1586, and with a standard deviation of 118.80170. The firm value variable has a minimum value of 0.13 and has a maximum value of 3.00. This shows that the Company Value ranges from 0.13 to 3.00, with an average value of 1.1549, and with a standard deviation value of 0.71672.

a. Classical Assumption Test
Normality Test

Table 5 Normality Test

Variabel	Kolmogrov-Smirnov	Sig (2-tailed)	p-value	Description
Unstandardized residual	0,126	0,059	P>0,05	Normal

Based on the normality test results in table 5, it is known that the Kolmogorov-Smirnov (KS) value is 0.126 and the Asymp. Sig. (2-tailed) value of 0.059. So it can be interpreted that the residual data in this regression model is normally distributed because the significance value is 0.059> 0.05.

b. Multicollinearity Test

Table 6 Multicollinearity Test Results

Variable	Tolerance	VIF	Description
Carbon Emissions Disclosure	0,929	1,076	No Multicollinearity
Environmental Performance	0,929	1,076	No Multicollinearity

Environmental Costs	0,998	1,002	No Multicollinearity

Based on the multicollinearity test results in table 6 it is known that all variables have a tolerance value ≥ 0.10 and a VIF (Variance Inflation Factor) value ≤ 10, so it can be concluded that the data is free from multicollinearity symptoms.

c. Heteroscedasticity Test

Table 7 Heteroscedasticity Test Results

Variable	Sig.	Description
Carbon Emissions Disclosure	0,906	No Heteroscedasticity
Environmental Performance	0,955	No Heteroscedasticity
Environmental Costs	0,571	No Heteroscedasticity

Based on the results of the heteroscedasticity test in table 7 it is known that all variables have a significance value greater than 0.05, so it can be concluded that the data is free of heteroscedasticity.

d. Autocorrelation Test

Table 8. Autocorrelation Test Results

Durbin-Watson	Description
1,976	No Autocorrelation

Based on the table above, it is known that the durbin watson value in this regression model is 1.967, the dU value is 1.6800 and the value (4-dU) is 2.024. It can be said that the data does not occur autocorrelation if dU < dCount < 4-dU. So if in the equation is 1.6800 < 1.967 < 2.024. So as in the decision making in Durbin Watson above, it can be concluded that there are no symptoms of autocorrelation.

Multiple Linear Regression Test

Table 9 Multiple Linear Regression Test

Variabel	B	Std.Error	t	Sig.
(Constant)	0,711	0,763	0,932	0,357
Carbon Emissions Disclosure	-0,691	0,789	-0,876	0,386
Environmental Performance	0,193	0,134	1,437	0,158
Environmental Costs	0,002	0,001	2,638	0,012

Based on the table above, the coefficient for the constant is 0.711 and the independent variable CED = -0.691; KL = 0.193; BL = 0.002, resulting in the regression equation as follows PBV = 0.711 - 0.691 CED + 0.193 KL + 0.002 BL + e. The regression equation is interpreted as follows:

1. The constant value (α) of 0.711 means that if the independent variable disclosure of carbon emissions, environmental performance and environmental costs is 0, the amount of the dependent variable firm value is 0.711.
2. The regression coefficient value of the carbon emission disclosure variable is -0.691, which means that if managerial ownership increases by 1 unit, the company value will decrease by -0.691.
3. The regression coefficient value of the environmental performance variable is 0.193, which means that if environmental performance increases by 1 unit, the company value will increase by 0.193.
4. The regression coefficient value of the environmental cost variable is 0.002, which means that if the environmental cost increases by 1 unit, the company value will increase by 0.002.

Hypothesis Test

1. F-test

Table 10. F Test Results

Variable	F count	F_{table}	Sig.	Description
CED, KL, BL	3,739	2,82	0,018	Influential

Based on table 10 above, it can be seen that the F value is 3.739 with a significant result level of 0.018. That this value is significant less than 0.05, which means that there is a significant influence of the independent variables together on the dependent variable. It can be concluded that disclosure of carbon emissions, environmental performance and environmental costs have a joint (simultaneous) effect on firm value.

2. T-Test

Table 11 t-test results

Variable	Tcount	T_{table}	Sig.	Description
Carbon Emissions Disclosure	-0,876	2,01537	0,386	Rejected
Environmental Performance	1,437	2,01537	0,158	Rejected
Environmental Costs	2,638	2,01537	0,012	Accepted

Based on the statistical test results presented in table 11, it can be interpreted as follows:

1. **First Hypothesis Test Results (H_1)**
   In this study, the first hypothesis (H_1) is the disclosure of carbon emissions. Based on the results of the statistical t test in table IV.9 above, it is known that the disclosure of carbon emissions has a significant value of 0.386 greater than 0.05. This indicates that H_1 is rejected. Therefore, it can be concluded that the disclosure of carbon emissions has no effect on firm value.
2. **Second Hypothesis Test Results (H_2)**
   In this study, the second hypothesis (H_2) is environmental performance. Based on the results of the t statistical test in table IV.9 above, it is known that environmental performance has a significant value of 0.158 greater than 0.05. This shows that H_2 is rejected. Therefore, it can be concluded that environmental performance has no effect on firm value.
3. **Third Hypothesis Test Results (H_3)**
   In this study, the third hypothesis (H_3) is environmental costs. Based on the results of the statistical t test in table IV.9 above, it is known that environmental costs have a significant value of 0.012 smaller than 0.05. This shows that H_3 is accepted. Therefore, it can be concluded that environmental costs affect firm value.

3. Test Coefficient of Determination (R2)

Table 12 Coefficient of Determination

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate
1	0,455		0,207	0,152	0,66017

Based on table 12, the adjusted R2 value is 0.152 or 15.2%. This shows that the firm value variable can be explained by the variable disclosure of carbon emissions, environmental performance and environmental costs by 15.2%. While the remaining 84.8% can be explained by other variables outside this research model.

Discussion

1. The Effect of Carbon Emissions Disclosure on Firm Value

Based on the results of hypothesis testing and t test, the first hypothesis is rejected, namely the disclosure of carbon emissions has no effect on firm value. This is indicated by a significance value of 0.386> 0.05, so it can be concluded that H1 is rejected. It can be concluded that the disclosure of carbon emissions has no effect on firm value, because wider disclosure of carbon emissions tends to reduce the value of the company, because investors only see everything that provides direct benefits to their capital decline.

The results of this study are in line with research conducted by Utami (2018) which states that disclosure of carbon emissions has no effect on firm value.

2. The Effect of Environmental Performance on Firm Value

Based on the results of hypothesis testing and t test, the second hypothesis is rejected, namely environmental performance has no effect on firm value. This is indicated by a significance value of 0.158> 0.05, so it can be concluded that H2 is rejected. This shows that environmental performance is not the main factor that can affect the level of company value and this happens because investors when investing their funds do not pay much attention to environmental performance and investors do not view environmental performance as important. The results of environmental performance in ensuring company value have not been said to be sufficient.

This is in line with the results of research conducted by Safitri & Sukarmanto (2021) which states that

environmental performance has no effect on firm value. In addition, Deswanto & Siregar's research (2018) also states that environmental performance has no effect on firm value.

3. Pengaruh Biaya Lingkungan Terhadap Nilai Perusahaan

Based on the results of hypothesis testing and t test, the third hypothesis is accepted, namely that environmental costs affect firm value. This is indicated by a significance value of 0.012 <0.05, so it can be concluded that H3 is accepted, which means that environmental costs affect firm value. Companies that budget for environmental costs show that they are concerned with environmental management issues. Be it the cost of preventing environmental pollution, or the cost of overcoming environmental pollution due to the company's production activities. In addition to showing the company's seriousness in terms of environmental management, the environmental costs budgeted by the company are to support the implementation of corporate social responsibility so that it can affect the company's value.

The results of this study are in line with research conducted by Siregar & Miraza (2022) which states that environmental costs affect firm value.

5. Conclusions

This study aims to obtain research evidence on the Effect of Disclosure of Carbon Emissions, Environmental Performance, Environmental Costs on Firm Value (Empirical Study of Coal Mining Companies on the IDX in 2019-2021). Based on the research results as described in the previous chapter, conclusions can be drawn, namely:

1. The carbon emission disclosure variable has a significant value of 0.386 greater than 0.05. This indicates that H_1 is rejected. Therefore, it can be concluded that the disclosure of carbon emissions has no effect on firm value.
2. The environmental performance variable has a significant value of 0.158 greater than 0.05. This indicates that H_2 is rejected. Therefore, it can be concluded that environmental performance has no effect on firm value.
3. The environmental cost variable has a significant value of 0.012 smaller than 0.05. This indicates that H_3 is accepted. Therefore, it can be concluded that environmental costs affect firm value.

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