

THE EFFECT OF DISCLOSURE OF GHG EMISSIONS (GREENHOUSE GAS), CARBON PERFORMANCE, AND COMPANY AGE ON COMPANY VALUE

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Abstract:

This study aims to examine the effect of GHG Emission Disclosure (Greengas House), Carbon Performance, and Company Age on Firm Value. The data used is secondary data obtained from the Indonesia Stock Exchange in the form of financial reports, annual reports, and company sustainability reports. The sampling technique uses a purposive sampling approach, namely by using a sampling method based on certain criteria set by the researcher. The data analysis technique was carried out using multiple regression analysis using the SPSS 29.0 application. This study uses energy sector companies listed on the Indonesia Stock Exchange for the period 2021-2023, totaling 86 samples. The results of hypothesis testing conducted in this study indicate that GHG Emission Disclosure and Company Age do not affect Firm Value. Meanwhile, Carbon Performance affects Firm Value. GHG emissions disclosure does not directly affect company value, as investors value profits and growth more. However, effective carbon emissions management enhances reputation and attracts investment. Company age also determines value through innovation and market adaptation, and supports growth.

Keywords: GHG Emission Disclosure, Carbon Performance, Company Age, Firm Value.

INTRODUCTION

Climate change is now a major issue for some business sectors, especially in the energy sector. This condition affects how stakeholders and investors view business sustainability in this industry, which affects the company's value. Company value also serves as one of the main benchmarks for a company's success (Aditya & Hwihanus, 2024). Company value is considered to indicate the ability of a business entity to influence supply and demand in the capital market, which can reflect public perception of the financial capacity of a business (Nurfianti & Simatupang, 2024). Therefore, a company must maintain its company value to ensure its survival in the future.

Greenhouse gas (GHG) emissions refer to emissions produced by carbon dioxide contained in the air layer that contribute to global climate issues. Efforts to reduce GHG emissions globally are regulated in an agreement known as the Kyoto Protocol. Indonesia also issued presidential regulation number 61 of 2011 concerning the reduction of GHG emissions and regulation number 71 relating to the calculation of GHG emissions at the national level (Ulum et al., 2020).

According to research by Priliana and Ermaya (2023), companies that show good carbon performance tend to have low carbon production levels, while companies with poor performance have higher carbon levels. As a precautionary measure against adverse effects and to avoid competitors who fail to imitate their steps, companies with strong carbon performance are usually more transparent when submitting data on carbon emissions. However, this study also states that carbon performance is not always directly related to emission disclosure. On the other hand, companies with low carbon performance that choose to disclose their emissions may face additional



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costs and greater reputational risks due to the spotlight on their poor carbon performance (Surawan et al., 2024).

Company Age refers to the length of time a company has been established and continues to operate to date. One way to assess a company is to look at its age or the length of time the company has been operating. The longer a company is, especially if its products are of high quality, the better known and recognized it will be by the public. In addition, the age of the company can also indicate how long the company has survived (Fahri et al., 2022). According to research by Muzayin and Trisnawati (2022), the value of a company usually increases with the age of the company.

This study aims to re-examine a number of factors suspected of influencing company value. Referring to the background explained previously, the author feels interested and motivated to conduct research related to "The Effect of GHG Emission Disclosure, Carbon Performance, and Company Age on Company Value."

Legitimacy Theory. According to Ratmono et al. (2021), Brown and Deegan (2012) revealed that it has been proven that companies consistently try to convince the public that their activities are in line with social norms and values that apply in society and the rules that the government has imposed. This study also explains that legitimacy is a form of the process of gaining trust and recognition from the community with the aim of the survival of a company. If a company does not follow the social norms and values of society, then the survival of the company will be threatened (Carolina et al., 2024).

Stakeholder Theory. The expectations and desires of each stakeholder are not always in line with the company's goals. In order to meet these expectations, the company receives requests and demands from stakeholders, either directly or indirectly, to provide information related to the environment (Sadira Ashia Priliana & Ermaya, 2023). This approach reflects a policy that takes into account the expectations and needs of all stakeholders. Meanwhile, the concept of social responsibility in stakeholder management shows that government factors influence corporate planning. Every stakeholder has the right to access information related to the company's operations that can influence their decision-making.

Agency Theory. Research by Jensen & Mecking (1976) in Hwihanus & Magitasiwi (2024) Agency theory is a relationship between two parties, where one party acts as the owner (principal) and the other party as the manager (agent). This theory explains the difference between owners and consumers. It shows that management has full authority in carrying out company operations and making decisions (Herawati et al., 2022). Therefore, there is an information relationship that connects the manager as the owner's representative and the owner as the party giving the mandate.

Company Value. The achievement of company performance results shows stakeholder trust in business management. Maximizing company value as indicated by an increase in stock prices during transactions on the Stock Exchange. Therefore, a greater increase in stock value than an increase in net book value reflects more company success in terms of sustainability and corporate financial management by paying attention to social and environmental interests (Aeni & Murwaningsari, 2023).

GHG Emission Disclosure. According to Ulum et al. (2020) Greenhouse Gas (GHG) Emissions are gases that appear as an impact caused by global warming, which causes the formation of the greenhouse effect. Increased emissions of gases such as Carbon Dioxide (CO₂), methane (CH₄), nitrogen oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆) are the ability of greenhouse gases to absorb solar radiation reflected by the earth's surface causing warming of the earth's atmosphere (Pratama et al., 2023).



Carbon Performance. Companies must consider the impact of their business activities on the environment. Environmental issues, especially carbon emissions, have received significant attention worldwide (Houten & Wedari, 2023). The increasing concentration of carbon dioxide in the atmosphere is another factor contributing to environmental problems. Carbon performance describes the results that show the amount of GHG emissions that can affect the climate situation and the efforts made by the company to reduce emissions (Priliana & Ermaya, 2023).

Company Age. Company age is defined as the period since the company was founded or listed on the stock exchange until now. The company's ability to survive, compete, and take advantage of market opportunities is greatly influenced by its age. Businesses that have been operating for a longer time generally have more knowledge and experience than businesses that have only been operating for a short time (Fahri et al., 2022).

Hypothesis Development. Research by (Ulum et al., 2020) found that GHG emissions have a negative and insignificant effect on company value. This finding indicates that the greater the disclosure of GHG emissions, the company's value tends to decrease. On the other hand, research by Gabrielle and Toly (2019) shows that greenhouse gas emissions have a positive effect on company value. This study reveals that the more companies disclose greenhouse gas emissions, the greater the value of the company. Zuhruhiyah and Anggraeni (2019) also revealed that greenhouse gas emissions have a positive effect on company value. It is because greenhouse gas emissions are considered as one of the factors considered by investors in assessing a company's performance.

H1: GHG Emission Disclosure Affects Company Value

According to research by Ratmono et al. (2021), Carbon Performance has a negative effect on Carbon Emission Disclosure because this study assumes that it does not affect the extent of carbon emission disclosure. Meanwhile, in research by Putu et al. (2023) Carbon Performance has a positive effect on Financial Performance. However, research by Aeni and Murwaningsari (2023) revealed that carbon emission disclosure has a positive and significant effect on company value. Likewise, research by Putri and Agustin (2023) revealed that carbon emission disclosure has a positive effect on company value.

H2: Carbon Performance Affects Company Value

According to Riyadi et al. (2021) the age of the company does not affect the value of the company. Based on the findings of this study, the company is still young, has more capital than debt, and has sufficient cash and cash equivalents to attract investors. In addition, in the study of Fahri et al. (2022) stated that in their study the age of the company affects the value of the company. Based on the results, investors will find it easier to buy shares of older or newly established companies than younger companies. It is even though investors believe that older businesses have higher profit levels. In line with research conducted by Muzayin and Trisnawati (2022) and (Hamdani, 2020), the age of the company influences its value of the company.

H3: Company Age Affects Company Value

METHODS

This study uses a quantitative approach. The data sources use secondary data, namely, literature data from books, official company websites, research journals, and previous research theses. Data is taken from the sustainability reports of financial and annual reports of energy companies listed on the IDX in 2021-2023 based on the official website of the Indonesian Stock Exchange (IDX). The sampling selection uses the purposive sampling method. The criteria for purposive sampling in this study are:

1. Energy companies listed on the Indonesia Stock Exchange during the period 2021-2023.



2. Energy companies in the period 2021-2023 that experienced delisting or suspension of stock trading during the research period.
3. Energy companies that do not have adequate and complete data related to the research data variables.

Based on these criteria, a sample of 34 companies was obtained.

Research Variables and Measurement

Dependent Variable. The variable that is the focus of this study is the value of the company. In this study, the value of the company is measured through the use of the PBV method. (Price to Book Value). The formula for PBV is:

$$PBV = \frac{\text{Market Price per Share}}{\text{Book Value per Share}}$$

Independent Variables. This study's independent variables are GHG Emission Disclosure, Carbon Performance, and Company Age.

GHG Emission Disclosure. As explained in the research of Gabrielle & Toly (2019), GHG emission measurement using the carbon emission disclosure index by Bae Choi et al. (2013) The way to measure GHG emissions is by giving a score to each item of the carbon emission disclosure index.

Table 1. Carbon Emission Disclosure

Category	Item	Information	Score
Climate Change: Risks and Opportunities	CC-1	Assessment/description of risks (whether regulatory, physical or general) associated with climate change and the steps that have been taken or will be taken to manage those risks.	1
	CC-2	Assessment/explanation of current (and future) financial impacts, business impacts, and opportunities resulting from climate change.	1
GHG Emissions	GHG-1	Description of the methodology used to perform the GHG emission calculations (e.g., GHG or ISO protocols)	1
	GHG-2	There is external verification of the quantity of GHG emissions by whom and on what basis	1
	GHG-3	Total GHG emissions (metric tons of CO2 produced)	1
	GHG-4	Disclosure regarding scope 1, 2, or 3 direct GHG emissions*	1
	GHG-5	Disclosure of GHG emissions based on source (coal, electricity)	1
	GHG-6	Disclosure of GHG emissions by facility level	1
	GHG-7	Comparison of GHG emissions with previous years	1
Energy Consumption	EC-1	Total amount of energy consumed (Tera-joules or Peta-joules)	1
	EC-2	Calculation of energy used from renewable sources	1
	EC-3	Disclosure by facility	1
	RC-1	Details of plans or strategies to reduce GHG emissions	1



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Carbon Emissions Accountability	RC-2	Specification of target level of GHG emission reduction and target year	1
	RC-3	Emission reductions and associated costs or savings that have been achieved to date as a result of the reduction plan	1
	RC-4	Future emission costs are taken into account in capital expenditure planning.	1
	ACC-1	Indication of the executive body that has overall responsibility for actions related to climate change.	1
	ACC-2	Description of the mechanisms by which the executive body reviews companies' progress on climate change	1

Source: (Bae Choi et al., 2013)

Carbon Performance. The measurement of this variable uses Carbon Emission Intensity. The formula for carbon performance is as follows:

$$CEI = \frac{Total\ Carbon\ Emission}{Total\ Sales\ of\ Firm}$$

Company Age. The measurement of this variable uses ratio measurement. The formula for Company Age is as follows:

$$Company\ Age = Research\ Year - Years\ Since\ IPO$$

Data Analysis. Data analysis was conducted using SPSS 29.0 statistical software and multiple regression analysis methods. The purpose of testing the hypothesis with this method is because the following model can be obtained:

$$PBV = a1 + \beta1X1\ it + \beta2\ X2\ it + \beta3X3\ it + e$$

Description:

PBV: Price to Book Value as an indicator of Company Value.

X1: GHG Emission Disclosure

X2: Carbon Performance

X3: Company Age

Y: Company Value

α 1: Constant or intercept.

β 1, β 2, β 3: Regression coefficients of each independent variable.

e: Error or residual.

It: Panel data, where i is the i-th company and t is the t-th period

RESULT AND DISCUSSION

Descriptive Statistics. This descriptive statistical test is used on 88 data samples by covering the minimum, maximum, average, and standard deviation measurements of each data. The results of the descriptive test are explained in Table 2 below:



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Table 2. Results of Descriptive Statistical Test

	N	Minimum	Maximum	Mean	Std. Deviation
Emission GHG (EG)	86	0,50	1	0,77	0,14
Carbon Performance (KK)	86	0,0000003	0,67	0,03	0,09
Company Age (UP)	86	1	33	13,30	8,17
Company Values (NP)	86	0,003	2,29	0,83	0,51
Valid N (listwise)	86				

Source: Processed with SPSS 29

Company Value, based on Table 2, shows the results of the descriptive statistical test of the minimum value of the Company Value of 0.003. Meanwhile, the maximum value is 2.29. In addition, the average value obtained overall is 0.83, and the overall standard deviation is 0.51.

Disclosure of GHG Emissions: Table 2 shows the results of the descriptive statistical test for the minimum value of GHG emissions of 0.50, while the maximum value obtained is 1. The average value of GHG emissions as a whole is 0.77, and the overall standard deviation is 0.14.

Carbon Performance, based on Table 2, shows the results of the descriptive statistical test of the minimum value of carbon performance of 0.0000003. The maximum value is 0.67. The overall average value is 0.03, and the overall standard deviation is 0.09.

Company Age: Table 2 shows the results of the descriptive statistical test of company age, with a minimum value of 1 and a maximum value of 33. The overall average value is 13.30, and the overall standard deviation is 8.17.

Table 3. Hypothesis Test Results t

Variable	β	t count	Sig 1 tailed	Decision
(Constant)	0,624			
Emission GHG (EG)	0,053	0,153	0,43	H1 Rejected
Carbon Performance (KK)	2,977	5,471	0,001	H2 Accepted
Company Age (UP)	0,005	0,844	0,200	H3 Rejected

Source: Processed with SPSS 29

Based on the calculation data in Table 3 above, the following regression analysis results can be obtained:

NP= 0.624+ 0.053EG + 2.977KK + 0.005UP

Based on the results of the t-test on the regression model, the calculated t-value of the GHG Emission variable is 0.153 with a significance of 0.43> 0.05; in other words, the significance value is greater than the limit set at a significance level of 5% (0.05). This value indicates that there is insufficient statistical evidence to support a significant influence of the GHG Emission Disclosure and Company Value variables.

Based on the results of the t-test on the regression model, the calculated t-value of the Carbon Performance variable is 5.471 with a significance of 0.001 <0.05 (significance level of 5%). This figure shows that the significance value is much smaller than the set limit. Thus, these results indicate that Carbon Performance influences Company Value.

Based on the results of the t-test on the regression model, the calculated t-value of the Company Age variable is 0.844, with a significance value of 0.200> 0.05. This figure shows that the



significance value is greater than the significance level of 5%. So, this Company Age variable does not affect Company Value.

CONCLUSION

This study examines the effect of GHG emission disclosure, carbon performance, and company age on company value. There are 34 research samples from 87 companies observed for the period 2021-2023. Company data is taken from the official IDX website, as well as the company's sustainability, financial, and annual reports. The conclusions from the tests conducted in this study are:

1. Disclosure of GHG emissions does not have an impact on company value because investors and other stakeholders tend to assess company performance based on other factors such as profit and growth. Therefore, disclosure of GHG emissions is not a top priority for investors. Suppose the company is known to have high emissions. In that case, investors may not view emissions as a determining factor in evaluating the company's value, even though it is important in the context of sustainability. In this case, other factors may be more accepted and measured by stakeholders as indicators, which may be more important in attracting investment than stand-alone emission figures.
2. Carbon performance has an impact on company value. In this case, when a company manages and reduces carbon emissions well, the company can improve its reputation and positive image in the eyes of investors, customers, and the community. Stakeholders tend to trust and appreciate a business that cares about the environment more. Control of carbon performance is also considered quite effective in avoiding risks related to increasingly stringent environmental regulations. This possibility is quite attractive to investors who are looking for businesses with a vision and commitment to a long-term environmental strategy. And ultimately, it can increase the value of the company.
3. The company age variable is very important to consider because it can indicate that other factors may have a greater impact on the company's value. For example, newer or shorter-lived companies are more likely to show rapid growth, and innovation is more attractive to investors. While older companies are often associated with stability and experience, they may struggle to adapt to market changes or stay relevant, which can negatively impact their value. In addition to the company's age, other components, such as financial performance, good management, and appropriate marketing strategies, have a greater impact on its value.

Limitations and Suggestions. This study has limitations in the analysis process, where 14 outlier data were found that could affect the validity of the findings even though they have been handled. For further research, it is recommended to use data transformation as a preventive measure to reduce the possibility of outliers, such as the logarithm or square root method. In addition, future research can add other variables, such as environmental performance with moderating variables, so that the analysis results are more comprehensive. Data analysis also needs to be carried out carefully using trimming or transformation techniques to reduce the impact of data variation. Thus, the research results can be more valid and can be better generalized.

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