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The Effect of Firm Value, Financial Performance, Environmental Performance, and Firm Size on Carbon Disclosure

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Abstract: The industrial sector is a leader in the global increase of carbon. As a result, the risk of natural disasters is inevitable. One way that can be done to reduce the occurrence of natural disasters is to reduce carbon emissions in the industrial sector. The purpose of this study was to determine the effect of company value, financial performance, environmental performance, and company size on carbon disclosure. The population used in the study amounts to 50 well-known companies listed on the European Stock Market. Based on the purposive sampling method, 16 companies were selected. The data for this study were sourced from the annual reports and sustainability reports of the companies. The study found that firm value and firm size have a positive effect on carbon disclosure. This is a signal for companies, in making efforts to reduce carbon emissions. The greater the efforts made by the company in reducing emissions, the higher the profitability achieved by the company.

Introduction

Climate-related problems are a new issue, which the world must face. One way to tackle the increase in climate change is to make efforts to reduce emissions. This has been stated in the Paris Agreement, which was issued in 2015. In the Paris Agreement, the goal is to reduce global emissions by 1.5%. Thus, all parties must be able to assist in reducing emissions.

The spread of emissions is almost evenly distributed in all countries, especially in developed countries. This is due to population density and the establishment of industrial centers (Rhodium, 2021; EPA, 2020; Jia et al., 2018). One of the biggest contributors to the increase in emissions is the industrial and energy sector (Yang et al., 2022; Pratama, 2021 Tao et al., 2019; Jia et al., 2018). Where the disposal of emissions in the industrial and energy sectors has increased every year. As a result of uncontrolled emissions, can cause

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environmental instability and increase the intensity of natural disasters (Hapsoro & Falih, 2020; Chang, 2018).

One way that companies can do this is through carbon disclosure. Several countries have issued legislation related to the obligation of companies to disclose the amount of their carbon emissions. However, carbon disclosure is still considered to be unable to be carried out optimally in the company. This is due to the additional costs that must be incurred by the company (Hapsoro & Ambarwati, 2020; Ganda, 2018; Liesen et al., 2017). One of the developed countries that requires companies to disclose carbon is the UK (Boamah, 2022) and several developing countries have also required companies to disclose carbon (Liu & Zhang, 2023). The existence of carbon disclosure by companies is expected to reduce the level of corporate carbon emissions.

Achievement theory is a theory introduced by David McClealland in 1970 (Hoesada, 2021). The purpose of achievement theory is to reward or achieve performance (Hoesada, 2021). David McClealland stated that achievement theory can relate to the world of economics and the success of an organisation. This is because a company will carry out all activities with careful planning to get an achievement or achievement. According to McClealland, the highest achievement to be obtained is material achievement. The material achievement achieved by the company is an increase in the company's profitability.

Achievement is an important thing for companies to achieve. This is because achievement can assess the performance of a company. Companies with good performance will find it easier to obtain capital. On the contrary, companies with poor performance are less attractive to stakeholders. The performance of a company can be assessed through financial reports and corporate sustainability reports. The financial report aims to inform the assessment of the company's financial performance, while the corporate sustainability report serves to inform the company's environmental performance (Nareswari et al., 2022; Qian, 2021).

There are many activities that companies can do to get good performance. However, companies must also consider funding for an activity and the risks that arise. Some activities that are considered capable of providing achievements for companies are company value, (Sherine et al., 2022; Clark et al., 2017) financial performance (Sapiri et al., 2022; Hermuningsih, 2019), environmental performance (Cupertino & Consolandi, 2019; Lee & Ahn, 2019), and company size (Agusti, 2021; Wuryani, 2013) and carbon disclosure (Ramadhan et al., 2023; Hardiyansah & Agustini, 2020). These five factors are considered capable of providing a good performance. The reason is that these five factors can improve the company's assessment from stakeholders. The company will also be able to easily obtain capital from stakeholders.

First, company value is an assessment given by stakeholders to the company (Sherine et al., 2022; Sembiring & Trisnawati, 2019). The feasibility level of company value can be seen from the increase in stock prices. This is because the stock price is a reflection of the assets owned by the company (Sherine et al., 2022; Sembiring & Trisnawati, 2019; Hardiningsih, 2017). Company managers must look at how much the company is worth, to increase the

company's capital. This is needed by the company, for funding further company activities. The second factor is financial performance. Financial performance is an achievement obtained by the company in the form of assets (Ferriswara et al., 2022; Sapiri et al., 2022; Maisharoh & Riyanto, 2020). Measurement of financial performance can be seen in the company's financial statements. Company reports are the final form of all records of activities carried out by the company. The existence of financial statements can detect how well the design and funds come out in a company. Good financial performance can provide good news to stakeholders because stakeholders will get a high return on capital (Velte et al., 2020; Kurniati, 2019). The third is environmental performance. Environmental performance is a company's achievement of its concern for the environment (Suratno, I.B., Darsono, D., and Mutmainah, 2007; Suhardi, 2001). Good corporate environmental performance implies that the company not only cares about environmental issues, but the company also has a responsibility for the preservation of its environment, either to the surrounding community or the natural environment. Companies with good environmental performance will be favored by stakeholders. The reason is that stakeholders see companies that care about the environment, get a high level of profit (Ma et al., 2024; Felisha & Rossieta, 2018). The fourth factor is company size. Company size is a measurement scale used to determine the level of the company (Agusti, 2021 Wuryani, 2013). The size of the company can be determined through the value of the company's total assets. Good company size will attract stakeholders (Wibowo & Surjandari, 2023; (Wuryani, 2013) This is because the company will disclose financial information transparently to stakeholders. Fifth, is carbon disclosure. Carbon disclosure is a disclosure that is done voluntarily in several countries (Santika & Permata Sari, 2022; Mateo-Márquez et al., 2020). However, in some developed countries, carbon disclosure by companies is mandatory. This is because to reduce environmental pollution continues to increase. Companies that disclose carbon are valued by stakeholders (Ramadhan et al., 2023; Hahn et al., 2015). The reason is that the company's awareness not only increases the company's assets but also looks at environmental sustainability.

The existence of environmental problems that occur today, many researchers conduct research related to carbon disclosure. The reason is that carbon disclosure can minimize the emissions released by the company and can increase stakeholder interest (Ramadhan et al., 2023; Hahn et al., 2015). But the results of these studies, there are still many contradictions. The results of the effect of firm value and carbon disclosure, state that firm value and carbon disclosure have a positive effect (de Grosbois & Fennell, 2022; Akbaş & Canikli, 2019). However, the results of other researchers state that company value and carbon disclosure have a negative effect (Ratmono et al., 2021; Hapsoro & Ambarwati, 2020; Putri et al., 2020). Conflicting research results are the effects of financial performance and carbon disclosure. (Velte et al., 2020; Andrian, 2020; Zulfian et al., 2020; Apriliana et al., 2019) state that financial performance has a positive effect on carbon disclosure. (Ratmono et al., 2021; Hapsari & Prasetyo, 2020; Kholmi et al., 2020; Mujiani et al., 2019) state that financial performance hurts carbon disclosure.

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This research is very important to do, considering that the company's activities will affect the assessment of stakeholders. Stakeholders will see how the company can minimize the company's risks and maximize the company's strengths. companies that can maximize their strengths and minimise their risks, will get financial benefits. The purpose of this research is to obtain empirical evidence regarding the influence of firm value, financial performance, environmental performance, and firm size on emission disclosure. The contribution of this research, among others, can be a consideration for companies, to be able to carry out carbon disclosure activities.

Research Method

The research method used in research related to carbon disclosure is based on quantitative methods. The quantitative method is a research method related to numbers, from the entire data set to the research results (Apuke, 2017; Hoe & Hoare, 2012).

This research is included in correlation research or can be called influence research between variables. The purpose of this study is to obtain empirical evidence related to the influence of firm value, financial performance, and environmental performance on carbon disclosure.

The population used in this study were the 50 largest industrial companies listed on the European Stock Exchange in 2017 - 2019. The sample collection method in this study, uses a purposive sampling technique, with the following conditions:

Table 1 Research sample

No	Description	Total
1.	The company listed in the 50 largest stocks in Europe	50
2.	Included in industrial companies	(12)
3.	Industrial companies that disclose financial statements for the period 2017-2019	(8)
4.	Industrial companies that disclose sustainability reports for the period 2017-2019	(7)
5.	Industrial companies that disclose emission reports on CDP for the period 2017-2019	(7)
6.	Number of samples	16
7.	Number of observation periods	3
8.	Total observation data	48

This research is quantitative. The data used in this study are secondary. Where the secondary data used are financial reports (Annual Report) and sustainability reports (Sustainable Report) from 2017 - 2019 obtained from the website of each company. The research technique used is Multiple Linear Regression. The reason is to see the effect between the independent variable and the dependent variable.

Data analysis techniques are used to be able to prove the hypothesis in this study. In this study, researchers used the Multiple Linear Regression analysis technique. The test in this

study used SPSS, as a testing tool. There are several stages required in conducting data analysis on multiple linear regression, that are;

a. Determining the estimated parameter values used in measuring the least squares method.
b. Conducting a classical assumption test on multiple linear regression analysis, namely the linearity assumption test, normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. This is done to see if there are deviations from the classical assumptions of multiple linear regression or if there are no deviations.
c. Conduct hypothesis testing. Hypothesis testing is done with a simultaneous test (F test) and a significance test (T-test).

The data collection technique in this study is processing the company's financial statements and sustainability reports. The company's financial statements and corporate sustainability reports that have been obtained will be processed with predetermined measurements. Data processing for carbon disclosure will use the Carbon Emissions Disclosure Index (Choi, et al., 2013).

Result and Discussion

The purpose of this study is to see the effect of dependent variables, namely firm value, financial performance, environmental performance, and firm size on independent variables, namely carbon disclosure. The population used in this study is the 50 largest industrial companies in Europe. The reason for choosing its location is because European countries are the first countries to make carbon disclosure an obligation that must be carried out for companies (Downar et al., 2021).

The sample used in this study amounted to 16 companies with an observation period of 3 years, namely from 2017 to 2019. The reason for the three-year observation period is that in 2017, there was a world conference that stipulated that the reduction in carbon emission levels would be 1.5% (Koide et al., 2021). The emission reduction stipulation applies from 2017 to 2030 (Koide et al., 2021). Furthermore, the deadline for the observation period is 2019, due to an outbreak that hit the whole world at the end of 2019. The outbreak that hit the world was the Covid-19 outbreak. At that time, it was not possible to make observations. Unstable finances during COVID-19 (Widiar & Setyahuni, 2023).

This study uses four independent variables and one dependent variable. The dependent variables used in this study are firm value, financial performance, environmental performance, and company size. The dependent variable used in this study is carbon disclosure.

The first stage in conducting data analysis is to determine the estimated parameter values used in measuring the least squares method. Determination of the parameter value, using descriptive statistical measurements. The following are the results:

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Table 2. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
TOBINS Q	48	.005176892446908	.532107347883702	.161320295413789	.135819657873096
ROA	48	.020638266290634	.135240490739919	.061091737850683	.032368222263011
ESG	48	.177241831040662	.709586303347148	.481309191799446	.126599741763500
UKUR	48	.321086571207191	.686403908865653	.465624142360204	.118486817616254
CDP	48	.777777777777778	.944444444444444	.880787037037037	.047237284947609
Valid N (listwise)	48				

The table above shows that the value of N is equal to the number of samples used in the study. In this study, the sample used was 48 research samples. The independent variable in this study is carbon disclosure. Carbon disclosure is measured using the index proposed by Choi et al. Each index is given a score of 1 for each carbon disclosure made by the company and 0 for companies that do not disclose carbon. The greater the score obtained by the company, the more open the company's carbon disclosure.

The data distribution shows that the minimum value of CDP is 0.78, the maximum value is 0.94, the mean is 0.88, and the standard deviation is 0.047237284947609. These results show that almost all companies have provided information related to carbon disclosure in full. Only a few companies are still unable to make complete carbon disclosures, including ASML Holding, Anheuser Busch Inbev, and Deutsche Post. Many factors hold companies back from making carbon disclosures. One of the factors is the funds spent on carbon disclosure, and the unpreparedness of the company to carry out carbon disclosure. Some of these things can be a barrier for companies. The reason is that the company must also be able to consider the impact received by the company.

Multiple Linear Regression Method Measurement Results

Classical Assumption Test

The first test carried out by researchers, before moving towards Multiple Linear Regression is the classical assumption test. The importance of the classical assumption test, before conducting Multiple Linear Regression testing, is to reduce data bias in research. There are four stages carried out in classical assumption testing, namely: first, multicollinearity test, second normality test, third is heteroscedastic test, and last is autocorrelation test.

Multicollinearity Test

The multicollinearity test is the first stage in the classical assumption test. The importance of multicollinearity testing is to see the correlation between the dependent variables. Multicollinearity testing can be seen in the Coefficients measurement. The multicollinearity test value can be seen from the VIF value. The VIF value is <10.00, indicating that there is a match between the independent variables.

Table 3. Result of Multicollinearity Test

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.233	.094		2.480	.017		
	TOBINS Q	-.047	.103	-.058	-.458	.649	.919	1.089
	ROA	1.810	.432	.527	4.187	<.001	.926	1.080
	ESG	.117	.113	.133	1.038	.305	.889	1.125
	UKUR	.294	.121	.313	2.437	.019	.886	1.128
a. Dependent Variable: CDP								

The first test result is multicollinearity testing. The table above shows that the VIF value between independent variables <10.00. The VIF value of the independent variable for Tobins'Q measurement is 1,089, ROA measurement is 1,080, ESG measurement is 1,125, and company size measurement is 1,128. This means that there is a correlation between the independent variables in this study or there is no multicollinearity between the dependent variables.

Normality Test

The normality test is the second stage in the classic assumption test. The normality test aims to assess whether the distribution of research variables is normally distributed or not. This test is important because it minimizes the occurrence of research distortions. The normality test can be seen on the P Plot table. Normally distributed research variables, the distribution of data will follow the diagonal line. on the other hand, for research variables that are not normally distributed, the distribution of data will move away from the diagonal line, in the P Plot table.

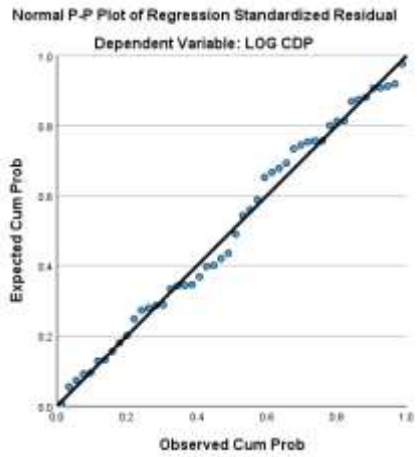

Figure 1. Result of the Normality Test

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The second classic assumption test result is the normality test. The P Plot table above can be interpreted, that the variables of this study are normally distributed. The reason is that the data distribution follows or is almost adjacent to the diagonal line. This is in line with the test results from the normality test, that the more the data distribution approaches or follows the diagonal line, the data can be said to be normally distributed.

Heteroscedasticity Test

The heteroscedastic test is the third stage in the classic assumption test. The purpose of the test is to see if there is an equality of variance or residuals between observations. The heteroscedasticity test is measured using a scatterplot. There is no heteroscedasticity, if there is no particular model in the scatterplot table. For example, the pattern gathers at one point or the data distribution is uneven.

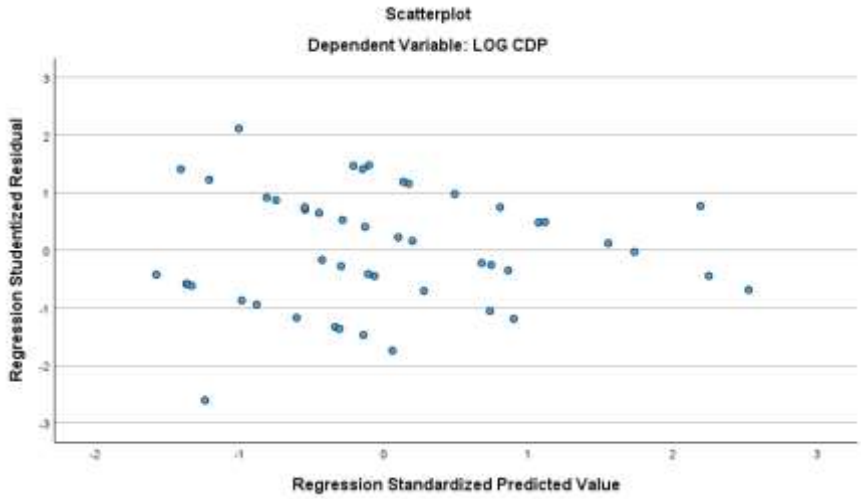

Figure 2. Result of the Heteroscedasticity Test

Seen from the scatterplot table above, shows that the distribution of the data does not gather only at one point. The data distribution also does not spread irregularly. So it can be concluded that this research data has passed the heteroscedasticity test.

Autocorrelation Test

The autocorrelation test is the fourth stage in the classic assumption test. The purpose of the autocorrelation test is to see the correlation between the period (t) and the previous period (t1). Autocorrelation testing is measured by using the run test measurement. The autocorrelation test value can be seen in the asymp sig value. If the asymp sig value is <0.05, it is stated that there is a correlation between period (t) and the previous period (t1). But on the contrary, if the asymp sig value> 0.05, then there is no correlation between period (t) and the previous period (t1).

Table 4. Result of the Heteroscedasticity Test

Runs Test	
	Unstandardized Residual
Test Value	-.00863
Cases < Test Value	24
Cases >= Test Value	24
Total Cases	48
Number of Runs	24
Z	-.146
Asymp. Sig. (2-tailed)	.884
a. Median	

In the run test table above, the asymp sig value is 0.884. Where this value is above or exceeds the value limit of the autocorrelation test. This means that the research data can be said to pass the autocorrelation test.

After carrying out four stages of classical assumption testing. The conclusion that can be drawn is that the data used in this study is valid data that is free from research bias. This statement is based on the fact of the test results, that the research data to be tested has passed each stage of classical assumption testing.

Multiple Linear Regression Analysis

The second test is multiple linear regression analysis testing. Multiple linear regression testing is to see the influence between the dependent variable (independent variable) and the independent variable (dependent variable). There are three stages of multiple linear regression testing, namely: the first stage is the determination test (R^2), the second stage is the Simultaneous test (F), and the last stage is the partial test (t).

Determination Test (R^2)

The determination test is the first test in multiple regression analysis. The determination test can be seen in the model summary table. The determination test aims to see the amount of influence between all dependent variables on the independent variable. The determination test can be assessed using R Square.

Table 5. Determination Test (R^2)

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608[a]	.370	.312	.092297094063057

a. Predictors: (Constant), UKUR, ROA, TOBINS Q, ESG
b. Dependent Variable: CDP

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The determination test value can be seen in the R Square column. The percentage of influence between the independent variable and the dependent variable is 100%. In the table above, the value of R Square is 0.370. This means that the effect of the dependent variable on the independent variable is 37%. The remaining 63% can be influenced by other variables that are not related.

Simultaneous Test (F)

The simultaneous test is the second test in multiple regression analysis. The purpose of the Simultan test is to see the level of significance of the influence of all dependent variables on the independent variable. The simultaneous test can be seen in the ANOVA table, precisely in the Sig column. The level of significant value used in simultaneous test testing is 5% or <0.05.

Table 6. Simultaneous Test (F)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.215	4	.054	6.317	<.001[b]
	Residual	.366	43	.009		
	Total	.582	47			

a. Dependent Variable: CDP

b. Predictors: (Constant), UKUR, ROA, TOBINS Q, ESG

The results of the simultaneous test calculation in the ANOVA table above, the significance value is <0.001. This means that there is a significant influence between the dependent variable and the independent variable. This is based on the maximum level value of the simultaneous test is <0.05.

Partial Test (t)

Partial test is the third test in multiple regression analysis. The partial test aims to see the influence of each dependent variable on the independent variable. Partial tests can be seen in the Coefficients table. The level of significant value used in this study is the same as the simultaneous test, which is 5% or <0.05. Partial test values can be seen in the Sig column.

Table 7. Partial Test (t)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.233	.094		2.480	.017		
	TOBINS Q	-.047	.103	-.058	-.458	.649	.919	1.089
	ROA	1.810	.432	.527	4.187	<.001	.926	1.080
	ESG	.117	.113	.133	1.038	.305	.889	1.125
	UKUR	.294	.121	.313	2.437	.019	.886	1.128

a. Dependent Variable: CDP

In the table above, it can be seen that the Sig value <0.05 is in the ROA and Measure columns. In the ROA column, the Sig value is <0.001. This means that there is a significant influence between the dependent variable (Financial Performance) and the independent variable (Carbon Disclosure). The reason is because the Sig level of ROA measurement is >0.05. The second dependent variable that affects the independent variable is Company Size. The Sig value of company size is 0.019. This means that there is a significant influence between the dependent variable (Company Size) and the independent variable (Carbon Disclosure).

Discussion

The Effect of Company Value on Carbon Disclosure

One of the factors that can increase stakeholder confidence is the increase in firm value. This is because the value of the company is related to the company's shares. A high company value means that the company can provide a return on investment to stakeholders. The company value in this study is measured using Tobins'Q. The results of this study indicate that firm value harms carbon disclosure. This is because the research sample used has a good level of Tobins'Q value. There are several companies whose company value is >1.00. The sample in the study is also a company that has strong branding. The conclusion is that carbon disclosure does not affect the company's investment return to stakeholders. The reason is companies that have good asset strength. This is in line with the theory of achievement. Company awareness of carbon disclosure is very important to do (voluntarily), regardless of stakeholders.

Effect of Financial Performance on Carbon Disclosure

The second hypothesis is the effect of financial performance on carbon disclosure. Financial performance is information related to the company's financial position, past and future (). A high financial performance ratio implies that the company can maintain its business stably (). Conversely, when a company cannot maintain its business well, its financial performance ratio decreases (). The value of financial performance in this study is measured using ROA (Return On Asset). ROA assessment, comparing income and assets in a company. Companies with ROA values> 0.5, imply that their financial performance is good. But on the contrary, the ROA value <0.5, suggests that the financial performance is not good enough. The results showed that financial performance has a positive effect on carbon disclosure. This statement can be proven from the results of multiple regression analysis in the coefficient table. In the table, the significant value of ROA measurement is <0.001. It can be concluded that there is a positive influence between financial performance and carbon disclosure. This is supported by the 2013 legislation in the United Kingdom related to carbon disclosure by companies. These results are in line with achievement theory, where there is a duty that must be fulfilled by the company because a company will not be able to survive without looking at the legislation of a country.

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Effect of Environmental Performance on Carbon Disclosure

The third hypothesis is the effect of environmental performance on carbon disclosure. Environmental performance is a company's responsibility to external parties, such as the surrounding community, and also environmental maintenance. The establishment of a company must have a negative or positive impact on the surrounding community and the environment. However, to fulfill the company's responsibility to society and environmental sustainability. The environmental performance value in this study uses the MSCI IVA ESG index assessment. The higher the MSCI IVA ESG rating, the better the company is at fulfilling its responsibilities and minimizing environmental risks. The results of this study indicate that environmental performance harms carbon disclosure. Sixteen companies used as samples of this study, almost fulfill the highest MSCI IVA ESG rating. This result is supported by the achievement theory, that risk minimization and the fulfillment of corporate responsibility for the environment are not only responsibilities but also corporate awareness of the importance of corporate responsibility to the environment and society.

The Effect of Company Size on Carbon Disclosure

The last hypothesis is the effect of company size on carbon disclosure. Generally, company size is divided into three categories, namely large firms, the second category is medium firms, and the last category is small firms (). Company size shows the total assets owned by the company. The greater the total assets of the company, the greater the capital obtained by the company (). Assessment of company size in this study, using company size assessment. The results of this study indicate that company size has a positive effect on carbon disclosure. The sixteen companies sampled in this study are among the 50 largest companies in the UK. Large companies tend to disclose carbon and activities voluntarily. This is due to the demands that companies must fulfill from stakeholders. The results of this study are supported by its relationship with achievement theory. The increase in capital income is an achievement obtained by the company. Thus, the company voluntarily performs other tasks that can increase the value of the company from stakeholders.

Conclusion

The results of this study indicate that firm value and environmental performance hurt carbon disclosure. The other two independent variables, namely financial performance, and company size, have a positive effect on carbon disclosure.

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