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The Role of Corporate Governance in the Determinant of Carbon Emission Disclosure in Indonesia

Adhissa Aztiannisa Aulia[1*], Zulfikar[2]
[1]Accounting, Faculty of Economics and Business, captainadhissa@gmail.com
[2]Muhammadiyah Surakarta University, Indonesia, zul200@ums.ac.id

[*]Corresponding Author: captainadhissa@gmail.com[1]

Abstract: This study aims to identify the role of corporate governance in carbon emissions disclosure in Indonesia, especially in the context of business size, industry type, and profitability. Against the backdrop of increasing awareness of climate change issues and the Indonesian government's commitment to reducing emissions, carbon emissions disclosure is becoming increasingly relevant. Through a quantitative approach, this study analyzes secondary data sourced from companies listed on the Indonesia Stock Exchange (IDX) during the period 2019 - 2022. The sample selection method applied is purposive sampling with a total of 155 from 2019-2022. This study explores whether business size, industry type, and profitability affect carbon emissions disclosure, and how the board of directors functions as a moderating variable in the relationship. The results are expected to contribute to corporate governance practices and regulations related to carbon emissions disclosure in Indonesia, as well as assist companies in improving the integrity and transparency of their environmental reporting.

Keywords: Carbon Emission, Carbon Emission Disclosure, Company Size, Industry Type, Profitability, Board of Director.

INTRODUCTION

Climate change and global warming are facts. Global average temperature in 2022 was recorded to have increased by 0.86 degrees Celsius compared to the average temperature of the 20th century, making it a year with the sixth highest temperature since 1880 (National Centers for Environmental Information, 2023). Global warming, ecological imbalances, technological problems, economic problems, and social problems are some of the problems that have been caused by climate change. In addition, extreme climate change also has significant consequences for the physical and mental health of the community. Directly, extreme climate events have the potential to increase the risk of mood disorders, post -traumatic stress (PTSD), and depression (Lawrance et al., 2022). Not only has an impact on human health, extreme climate change contributes to reduced agricultural production, limited supply of clean water, increased risk of forest fires, to shrinking land area that can be utilized (Bozoglu dkk., 2019).

One aspect that contributes to global warming is carbon emissions. The carbon released is included in the greenhouse gas category. Most of these emissions are produced through various human activities in daily life, especially burning, such as the use of motor vehicles, electricity production, industrial activities, and others. Between 1990-2010, Chinese carbon emissions increased by 174%, contributing 27% of the total world carbon emissions. In addition, various developed countries such as Britain, the United States, and Australia played a significant role in the contribution of global carbon emissions (Abeydeera dkk., 2019). When viewed from the number of emissions per capita, four countries with the highest emissions are China, the United States, the European Union, and Indonesia (Jaggi et al., 2011). The Ministry of Energy and Mineral Resources (2013) said that the industrial sector used 70% of fossil fuels to produce emissions. One of the main sectors contributing emissions in developing countries, including Indonesia, is the mining industry, which includes commodities such as gas and oil, coal, and so on. Indonesia issued 2.30 tons of CO2e per person in 2019, according to the World Bank data.

The Indonesian government realizes that increasing carbon emissions has detrimental consequences, such as climate change and potential losses to the national economy. To reduce this risk, regulations are needed that can guarantee the availability of funding related to climate issues. One of the policy steps implemented by the government is the imposition of carbon tax. The regulations governing the carbon economic value in Indonesia have been determined through Presidential Regulation Number 98 of 2021 concerning Carbon Economic Value (NEK) and Law No. 7 of 2021 concerning Harmonization of Taxation Regulations (UU HPP), each containing provisions related to the application of carbon tax. The government is still thinking about ways to determine carbon taxes. Projected in 2025, carbon trading, including carbon tax will begin. Considering the government's commitment in suppressing carbon emissions, the active involvement of all stakeholders becomes a very crucial aspect. The inclusion of the responsibility of the company to carbon emissions in the sustainability and annual reports is a form of accountability and openness. However, in Indonesia, reporting carbon emissions are still carried out voluntarily (voluntary disclosure). As a result, only a small number of companies reveal information about carbon emissions in their reporting documents. Annual reporting standards/sustainability reporting in Indonesia do not directly regulate disclosure of carbon emissions.

By expressing carbon emissions, companies can be seen as well by investors. Therefore, business actors must participate in protecting the environment from the impact of environmental changes. One method that can be applied is to include information about carbon emissions in the company's sustainability or annual report. An important decision regarding the disclosure of carbon emissions is influenced by good company management. Various aspects that are in the highlight in the governance include the principles of transparency, accountability, independence, justice, and responsibility. Companies that choose to express carbon emissions consider various factors, including receiving legitimacy from stakeholders and avoiding various risks, especially for entities that contribute to greenhouse gas emissions. These risks include an increase in operational costs, threats to the company's reputation, reduced demand, the possibility of dealing with lawsuits (legal proccedings), as well as sanctions in the form of fines and penalties (Berthelot et al., 2011). This study uses the Commissioners and Board of Directors as a management structure.

Previous research conducted by (Prasetyo, 2022) with the title Determinants of Carbon Tax Implementation. Empirically this study tests the relationship of carbon tax application with several variables, namely voluntary awareness, behavior changes, business performance, business size and business growth. The analysis of multiple regression models is based on 52 company respondents in East Java who run a forestry, energy and transportation business in Malang Raya (Malang Regency, Malang City, Batu City), Pasuruan Regency and Blitar Regency. The results showed that the application of carbon tax was significantly and positively

related to voluntary awareness and business size, as well as significantly and negatively related to business performance. All studies have not succeeded in supporting the hypothesis of the relationship between the application of carbon tax and changes in behavior and business growth. These results show that the application of carbon tax based on the principle of Polluters-Pay has taken place. A philosophy that reflects the carbon tax function as a continuous activity towards efficiency, low carbon and environmentally friendly. Internal awareness of taxpayers regarding the application of carbon emissions or carbon pricing tariffs in business activities carried out. Carbon economic value that affects the realization of the application of the sustainability report.

Other studies conducted by (Widhya & Saptiwi, 2019) with "Disclosure of Carbon Emissions: Testing the Role of Industry Types, Environmental Performance, Company Characteristics and Audit Committee". In recent decades, debate about climate change and global warming has triggered concerns not only among the people, but also in the global business world. This study explains why uncontrolled carbon emissions are one of the causes. The struggle of each country in encouraging economic growth through the industrialization process also contributes to the increasing impact of global climate change. Therefore, internationally collective action is needed to respond to the threat of climate change that has the potential to endanger the survival of humans. This study aims to investigate "how the type of industry, environmental performance, company characteristics (such as profitability, leverage, company size), and the audit committee have an impact on the level of disclosure of carbon emissions". The focus of this research is to various companies recorded on the Indonesia Stock Exchange (IDX) for the 2012-2016 period. Using the Purposive Sampling Method, 117 companies were obtained as research samples which were then used to test the proposed hypothesis. The results of the regression analysis indicate that the size of the company, the existence of an audit committee, and environmental performance has a positive influence on the level of disclosure of carbon emissions. Conversely, the type of industry and profitability indicate a negative relationship, while leverage does not have a significant effect on disclosure of carbon emissions.

In addition there are also examples of tax imposition cases in Finland DSN Sweden and their differences with Indonesia. According to (Barus & Wijaya, 2022) in the journal with the title "Application of Carbon Tax in Sweden and Finland and its comparison with Indonesia". The application of carbon tax policy in the three countries shows significant differences, especially in the aspect of tariff amount, implementation mechanisms, and sectors that are the object of tax. In terms of tariffs, Sweden and Finland as Nordic countries apply carbon tax with a very high nominal, which is far different compared to policies that apply in Indonesia. Conversely, Indonesia chose to apply a relatively low tariff. This approach aims to minimize resistance from the community and the business world also provides time and opportunities for the industrial sector in transitioning transitions towards more environmentally friendly technology. With regard to its implementation mechanism, Indonesia applies a combination of carbon trading systems and carbon tax policies, which are declared as cap-and-tax schemes. This is different from the approach used by the nordic countries, where carbon tax and carbon trading are completely separated from each other. Sweden and Finland apply the carbon tax policy imposed on the use of fossil fuels, especially in the transportation and heating sectors. Meanwhile, for other sectors, carbon trading mechanisms are implemented. As previously explained, the carbon tax scheme adopted by Indonesia has a fundamental difference when compared to the system implemented in Finland and Sweden. Indonesia began to implement carbon tax in stages and with a more careful approach since April 2022, with plans to expand its scope to the power generation sector in 2025. On the other hand, the policies implemented in Sweden and Finland include almost all industries that produce emissions, except for certain sectors that are considered high significance for their economy. Because of these exceptions,

the two countries eventually only impose carbon tax on fossil fuels used in the transportation and heating sectors.

METHODS

The study was carried out using a quantitative method with a scoping review approach. Scoping Review is an approach in research that has a purpose to identify literature comprehensively and in depth. This technique collects sources with various research methods, which have a connection with the subject of the study (Arksey & O'Malley, 2005).

In this study, the type of data used is secondary data with population coverage in the form of companies listed on the Indonesia Stock Exchange (IDX) or the Indonesia Stock Exchange (IDX) during the period 2019 to 2022. Data collected sourced from the company's annual reports available on the official IDX website (www.idx.co.id) and the official website of each company. The selection of samples is done through the purposive sampling method by setting several criteria as follows:

1. Energy sector companies listed on the IDX for the period 2019 - 2022.
2. Companies that provide annual report data (Annual Report), and Sustainability Reports in full.
3. Companies that reveal related to carbon emissions, both in the form of policies and regulations regarding greenhouse gas or carbon emissions, or that at least deliver a component of carbon emission disclosure.

This research population is a company recorded on the Indonesia Stock Exchange or the Indonesia Stock Exchange in the 2019-2022 period. Based on the sample criteria specified in this study, 53 companies in the energy sector were selected for samples, with a total of 212 samples used and 57 outliers of data, so that the total sample was 155 during the 2019-2022 period.

Measurement of research variables

Carbon Emission Disclosure (Y)

Disclosure of carbon emissions is done by referring to indicators of disclosure set by The Global Reporting Initiative (GRI). Determination of Carbon Emissions was obtained by conducting content analysis from the Sustainability Report of the Ulisting Company. This disclosure process is seen based on emission aspects in the environmental category contained in GRI standards. The number of GRI items revealed is called disclosure, the ratio between disclosure and index is a score. Where the formula used is) CED = (∫di/ m). Note: ∫di = "Total items revealed", m = "Maximum total items" (7 items). In research (Amaliyah & Solikhah, 2019) List of indicators of disclosure of carbon emissions in this study can be found in Table 1.

Table 1 Carbon emission disclosure items

No.	Category	Item
1	Environment - emissions	"Disclosure of direct greenhouse gas emissions (GRK) (coverage 1)."
		"Disclosure of indirect greenhouse gas energy emissions (GHG) (coverage 2)."
		"Disclosure of other indirect greenhouse gas emissions (GRK) (coverage 3)."
		"Disclosure of the Intensity of Greenhouse Gas Emissions (GHG)."

	"Disclosure of reducing greenhouse gas emissions (GHG)."
	"Disclosure of Ozone Destructive Emissions (BPO)."
	"Disclosure of nitrogen oxide (NOX), sulfur oxide (SOX), and other significant air emissions."

Source: The Global Reporting Initiative, 2018

Company Size (X1)

The company size represents the amount or scale of the company, both in small and large categories. Larger assets can show the size of the company, so it is important to manage assets well to keep the company's size high. The size of the company is Natural Logarithm (LN) Total Assets (Irwhantoko & Basuki, 2016). This study uses natural logarithms to reduce data changes without changing the initial value and making the total asset value simpler. To determine the company size, there is the following formula:

$$Company\ Size = LN(Total\ Asset)$$

Industry type (X2)

The type of industry refers to the characteristics inherent in a business entity related to the business sector, the level of operational risk, the number of workers, and the business environment. In research (Kuswanto, Wiyatamandala College of Economics, 2019) Measurement of the type of industry is carried out using dummy variables. Score 1 is given to companies that present GRI items, while the company that does not reveal it gets a score of 0.

Profitability (X3)

Profitability is defined as the ability of a business entity in obtaining profits through the use of various resources, such as capital, assets, and income from sales. In this study, the indicators used to measure profitability are Return on Assets (ROA) (Sembiring, 2006). ROA represents the extent to which an organization is able to optimize its assets to generate income. The greater the value of this ratio, the more effective the use of assets in creating profits. Therefore, in this study, the level of profitability is proxied by ROA, the calculation is carried out based on the following formula:

$$ROA = \frac{Earning\ After\ Tax}{Total\ Asset} \times 100\%$$

Board of Directors (M)

As part of Corporate Governance, the Board of Directors has the main responsibility in designing a sustainable business strategy. This aims to ensure that every material risk related to the company's operational impacts on the environment can be monitored carefully and expressed by transparent and comprehensive (Ben-Amar et al., 2017).

The existence of the number of board members of the Board of Directors who has more potential to increase the effectiveness of supervision in a company. With the increase in this supervisory function, it will be more for companies to pay attention to the environmental consequences of their operational activities and implement various efforts to mitigate negative impacts, as caused by carbon emissions. To obtain legitimacy for the company's activities, the Board of Directors play a role in conveying information through disclosure related to carbon emissions, which aims to make public expectations can be met. Therefore, companies with a number of board members who are more likely to have a higher opportunity in conveying information about carbon emissions and managing various problems related to the issue (Kılıç & Kuzey, 2019). As conducted in the study (Manurung, 2017) that the size of the Board of

Directors was obtained from the number of members of the Board of Directors of the Company, so the formula for finding the Board of Directors, namely:

$$Board\ of\ Directors = \sum \quad Board\ of\ Directors\ member$$

RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistical test results can be explained in Table 2 below:

Table 2 Descriptive Statistical Analysis Results

Variable	N	Minimum	Maximum	Mean	Std. Dev
Company Size	155	23.882061	32.759548	29.11104504	1.750335077
Industry Type	155	0	1	.53	.501
Profitability	155	.000113	.616346	.09089094	.115571432
Board of Directors	155	2	11	4.17	1.855
Carbon Emission Disclosure	155	0	7	1.52	2.142

Source: Processed (2025)

Variable Carbon Emission Disclosure has a minimum value of 0 and the maximum value of 7. The average value recorded 1.52, which is smaller than the standard deviation of 2,142. This indicates that the distribution of carbon emissions is not homogeneous, which means there is a significant disparity between one data with another data.

The company size variable has a range of value from a minimum of 23,882061 to a maximum of 32.759548. The average value of 29,11104504 is higher than the standard deviation which is worth 1,750335077. This shows that the distribution of business size data tends to be evenly distributed, so there is no striking difference between one data and another.

Industrial Type Variables The minimum value is 0 and the maximum value of 1. With an average value of 0.53 which is greater than the standard deviation of 0.501, it can be concluded that the distribution of industrial type data is evenly distributed, so that there is no significant gap between data.

The profitability variable has a minimum value of 0.000113 and the maximum value is 0.616346. The average variable is 0.09089094, which is smaller than the standard deviation of 0.115571432. This indicates that the distribution of profitability data is not homogeneous, which means there is a significant disparity between one data with another data.

The Board of Directors' variables have a minimum value of 2 and the maximum value11. The average of this variable is 4.17, which is greater than the standard deviation of 1,855. This finding indicates that the distribution of board of directors' data is more evenly distributed, so there is no striking difference between one data with another data.

Classic Assumption Test Results

Normality Test

In this study the normality test was carried out by applying the Central Limit Theorem (CLT). Based on this principle, if the number of samples exceeds 30, the data can be considered normally distributed. Considering the number of samples in this study reached 155, it can be concluded that data has a normal distribution.

Multicollinearity Test

Analysis of multicollinearity on a regression model is carried out by considering the value of variance inflation factor (VIF) and tolerance value, the results are presented below:

Table 3 Multicollinearity Test Results

Variable	Tolerance	VIF	Information
Company Size	.591	1.693	There is no multicollinearity
Industry Type	.709	1.410	There is no multicollinearity
Profitability	.866	1.154	There is no multicollinearity
Board of Directors	.653	1.531	There is no multicollinearity

Source: Processed (2025)

Referring to the table 3 above, it can be observed that each variable has a tolerance value> 0.10 and the VIF value <10. Therefore, it can be concluded that there is no multicollinearity in all variables used in this study.

Heteroscedasticity Test

Table 4 Heteroscedasticity Test Results

Variable	Sig	Standard	Information
Company Size	0,132	>0,05	Heteroscedasticity free
Industry Type	0,314	>0,05	Heteroscedasticity free
Profitability	0,404	>0,05	Heteroscedasticity free
Board of Directors	0,065	>0,05	Heteroscedasticity free

Source: Processed (2025)

The test applied by researchers to detect heteroscedasticity is to use the Spearman-RHO test. Referring to the results presented in Table 4, all independent variables indicate a significance value> 0.05. Therefore, it can be said that the regression model used in this study does not experience heteroscedasticity problems.

Autocorrelation test

The test used by researchers in the autocorrelation test is the Durbin Watson test. The two tests in this study are explained in the following table 5:

Table 5 Autocorrelation Test Results

Durbin Watson	Information
2.063	There is no autocorrelation

Source: Processed (2025)

Referring to Table 5, the Durbin-Watson value is 2,063, which is higher than the du value of 1,7906 but is still in the range of less than 4-DU (2,2094), it can be concluded that the regression model in this study there is no autocorrelation.

Multiple Linear Regression Test Results
Equation I (before moderation)

Multiple linear regression data analysis is carried out using SPSS version 26, and the results are presented in Table 6 below:

Table 6 Multiple Linear Regression Test Results

Variable		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.863	2.310		-4.703	.000
	Company Size	.371	.086	.303	4.335	.000
	Industry Type	1.928	.273	.451	7.058	.000
	Profitability	3.383	1.071	.183	3.158	.002
	Board of Directors	.059	.077	.051	.763	.447

Source: Processed (2025)

$$Y= (10,863) + 0,371X1 + 1,928X2 + 3,383X3 + e$$

a. The constant (a) has a value of -10,863, which indicates that if the independent variable is assumed to be zero (0), the carbon emission disclosure is at -10,863.
b. The regression coefficient that represents the effect of company size variables on Carbon Emission Disclosure is positive value of 0.371. The t test results show a value of 4.335 with sig. 0,000 (0,000 <0.05). This indicates that the size of the company is getting bigger, so the level of disclosure of carbon emissions carried out is even higher, so it can be concluded that the size of the business affects the carbon emission disclosure.
c. The industrial type variable regression coefficient of Carbon Emission Disclosure has a value of 1.928 in a positive direction. The T test results produce a value of 7,058 with a significance of 0,000 (0,000 <0.05 Based on the findings obtained, it can be concluded that the category of industrial type is increasingly directly proportional to the increase in the level of disclosure of carbon emissions by the company.
d. Profitability variable regression coefficient of Carbon Emission Disclosure has a positive value of 3.383. The T test results show a value of 3,158 with the GIS level. 0.002 (0.002 <0.05). This result indicates that the profitability of a company is getting bigger, so the level of disclosure of carbon emissions is carried out even higher. Therefore it can be concluded that profitability affects Carbon emission disclosure.
e. The regression coefficient of the Board of Directors' variables against Carbon Emission Disclosure obtained 0.059 in a positive direction. The t -test results obtained were 0.763 and Sig 0.447 (0.447> 0.05). Based on the acquisition of these values, the moderation variable is rejected, so it can be concluded that the Board of Directors has no influence on Carbon Emission Disclosure.
f. Error Standard (E) is a stochastic variable that has a probability distribution and reflects all factors that can affect the Y variable but not included in the regression equation.

Hypothesis Test Results
Equation I (before moderation)
F Test

The F test in this study was explained in the table below:

Table 7 F Test Results

Model	F	Sig.
Regression	48.925	.000[b]

Source: Processed (2025)

From Table 7 above the significance value is 0.00. This value indicates that it is 0,000 <0.05, so it can be concluded that the variable (X1) of the business size, (X2) type industry, as well as (x3) profitability affects (y) carbon emission disclosure.

Determinant Coefficient (R Square)

In this study, the level of the coefficient of determination is explained through the adjusted R Square (R^2) value. Information about the coefficient of determination can be found in Table 8 below:

Table 8 Determinant Coefficient Test Results (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752[a]	.566	.555	1.430

Source: Processed (2025)

Table 8 above indicates the R Square (R2) value obtained is 0.555 or 55.5%. This figure indicates that independent variables are the business size variable (X1), the type of industry (X2), and profitability (X3) are able to explain the variability of the dependent variable, namely Carbon Emission Disclosure (Y) of 55.5%. Meanwhile, the remaining 44.5%(100%-55.5%) is explained by other factors outside of this study.

Multiple Linear Regression Test Results
Equation II (after moderation)

Table 9 Multiple Linear Regression Test Results

	Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.305	5.381		1.543	.125
	Company Size	-.250	.191	-.204	-1.308	.193
	Industry Type	2.436	.741	.570	3.288	.001
	Profitability	-6.906	2.971	-.373	-2.324	.021
	Board of Directors	-5.345	1.393	-4.627	-3.837	.000
	Business Size*Board of Directors	.175	.048	4.879	3.605	.000
	Industry Type*Board of Directors	-.101	.179	-.132	-.562	.575
	Profitability*Board of Directors	1.942	.518	.646	3.745	.000

Source: Processed (2025)

$$Y = 8{,}305 + (0{,}250X1) + 2{,}436X2 + (6{,}906X3) + 0{,}175X1M + (0{,}101X2M) + 1{,}942X3M + e$$

a. The constant value (a) obtained is 8,305, which indicates that when the independent variable is assumed to be zero (0), the Carbon Emission Disclosure reaches 8,305.

b. The value of the regression coefficient obtained for the company size variable for Carbon Emission Disclosure is -0.250 in a negative direction. The t -test results are -1,308 and sig 0.193 (0.193> 0.05). These results show that the greater the size of the business does not affect a company in expressing carbon emissions, so it can be concluded that the size of the business does not affect the carbon emission disclosure.
c. The regression coefficient value of the industrial type variable against Carbon Emission Dysclosure is 2,436 in a positive direction. The t -test results obtained 3,288 and Sig 0.001 (0.001 <0.05). These results show that the higher the type of industry, the higher the company in expressing carbon emissions, so it can be concluded that the type of industry affects the carbon emission disclosure.
d. The regression coefficient value obtained by the profitability variable against Carbon Emission Disclosure is -6.906 in a negative direction. The t -test results were obtained -2.324 and Sig 0.021 (0.021 <0.05). These results indicate that the greater the level of profitability achieved by a business entity, the scope of disclosure of carbon emissions that is carried out more broadly, so that profitability variables affect carbon emission disclosure.
e. Value of the Board of Directors' regression coefficient of Carbon Emission Disclosure Sebesar -5,345 in a negative direction. The t -test results are obtained -3,837 and sig 0,000 (0,000 <0.05). Based on the value obtained, the moderation variable is declared accepted, so it can be concluded that the Board of Directors has an influence on Carbon Emission Disclosure.
f. The coefficient of regression coefficient of company size and board of directors is 0.175 in a positive direction. The t -test results obtained 3,605 and sig 0,000 (0,000 <0.05). This means that it can be said that the existence of the Board of Directors is able to strengthen the relationship between the size of the business and the Carbon Emission Disclosure.
g. The coefficient value of the interaction regression of the type of industry and the Board of Directors is -0.101 with a negative direction. The t -test results were obtained -0,562 and SIG 0.575 (0.575> 0.05). This means that it can be said that the board of directors is not able to strengthen the relationship between the type of industry and carbon emission disclosure.
h. The coefficient value of the profitability and board of directors interaction is 1.942 in a positive direction. The t -test results obtained 3,745 and sig 0,000 (0,000 <0.05). This means that it can be said that the board of directors can strengthen the relationship between profitability and carbon emission disclosure.
i. Error Standard (e) is a random variable that has a probability distribution, where this variable represents all factors that affect the Y variable but are not included in the regression equation.

Hypothesis Test Results

Equation II (after moderation)

F Test

The F test in this study is explained in the table below:

Table 10 F Test Results

Model	F	Sig.
Regression	37.944	.000[b]

Source: Processed (2025)

From Table 10 above the significance value of 0.00. This indicates that it is 0,000 <0.05, so it can be concluded that (X1) business size, (X2) industry type, (X3) profitability, (x1m), (x2m), and (x3m) affect (y) carbon emission disclosure.

Determinant Coefficient (R Square)

The coefficient of determination is explained using the Adjusted R Square (R2) value. In this study can be explained in Table 11 as follows:

Table 11 Determinant Coefficient Test Results (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.802[a]	.644	.627	1.309

Source: Processed (2025)

Table 11 above shows the value of R Square (R2) is 0.627 or 62.7%. This value indicates that independent variables are the company size variable (X1), Industry Type (X2), Profitability (X3), (X1M), (X2M), and (X3M) have a contribution of 62.7% or 0.627 in explaining the dependent variable, namely Carbon Emission Disclosure (Y). Meanwhile, the part that was not explained, which was 37.3% (100% - 62.7%), was influenced by other factors that were outside the scope of this research.

Discussion

The size of the company has no effect on carbon emission disclosure

Referring to the results of this study, the significance value for the variable size of the business is 0.193. This value exceeds the significance threshold of 0.05, which indicates that the hypothesis is rejected. Therefore, it can be concluded that the size of the business has no influence on the disclosure of carbon emissions. This finding is consistent with the study of Saputri (2023), which also revealed that the size of the business does not have an effect on Carbon Emission Disclosure.

Industrial type affects Carbon Emission Disclosure

Referring to the results of the study, the industrial type variable has a significance value of 0.001. Because of this value <0.05, the hypothesis is accepted. In other words, the type of industry has an influence on the disclosure of Carbon Emission Disclosure. Business entities that have high levels of carbon emissions due to operational activity tend to be more active in expressing information related to environmental issues compared to business entities that have lower carbon emissions. According to previous research (Apriliana et al., 2019; Zulaikha, 2016), it provides the result that the type of industry affects Carbon Emission Disclosure.

Profitability affects Carbon Emission Disclosure

Referring to the results of the research obtained, the profitability variable shows a significance value of 0.021. This value is lower than the significance limit of 0.05, so the hypothesis in this study was accepted. Thus, it can be concluded that profitability has an influence on carbon emission disclosure. These findings indicate that companies that have greater ability to use assets optimally to achieve profits tend to be more transparent in presenting information about carbon emissions. Previous studies conducted by (Apriliana et al., 2019; Zanra et al., 2020), found that profitability affects the disclosure of carbon emissions.

The Board of Directors is able to moderate the size of the business of carbon emission disclosure

Referring to the results of this study, the significance value of the business measure variable and the Board of Directors (X1M) 0,000. This value is lower than the significance limit of 0.05, so the hypothesis is accepted. Therefore, it can be concluded that the Board of Directors is able to moderate the relationship between the size of the business and the Carbon Emission Disclosure.

The Board of Directors is unable to moderate the type of industry against carbon emission disclosure

Referring to the results of this study, the significance value of the industrial type variable and the Board of Directors (X2M) of 0.575. This value shows greater than with a significance brick of 0.05. Then the hypothesis is rejected. Thus, it can be concluded that the Board of Directors can not moders the relationship between the type of industry and the Carbon Emission Disclosure.

The Board of Directors is able to moderate profitability of Carbon Emission Disclosure

Referring to the results of this study, the significance value was obtained in the profitability variable and the Board of Directors (X3M) 0,000. This value shows smaller than the significance level of 0.05. This means that the hypothesis is accepted. Therefore, it can be concluded that the board of directors is able to moderate the relationship between profitability and carbon emission disclosure.

CONCLUSION

Conclusion

This study has the aim of empirically testing the effect of business size, industrial type, and profitability of Carbon Emission Disclosure with the Board of Directors as a moderation variable in the 2019-2022 energy sector company. Based on the results of the test and discussion that has been carried out in this study, it can be concluded as follows:

1. The size of the company has no influence on the Carbon Emission Disclosure as indicated by the significance value of 0.193> 0.05. Thus, the size of the company both large and small has no influence on Carbon Emission Disclosure.
2. Industry type has an influence on Carbon Emission Disclosure with a significance value of 0.001 <0.05. The type or type of company has an influence on carbon emission disclosure.
3. Profitability has an influence on carbon emission disclosure. With a significance value of 0.021 <0.05. High and low profitability of a company has an influence on Carbon Emission Disclosure.
4. The Board of Directors is able to moderate the size of the company of Carbon Emission Disclosure. This is due to a significance value of 0,000 <0.05.
5. The Board of Directors is unable to moderate the type of industry against Carbon Emission Disclosure. This is due to a significance value of 0.575> 0.05.
6. The Board of Directors is able to moderate the profitability of the carbon emission disclosure. This is due to a significance value of 0,000 <0.05..

Limitations

1. The test results that have been carried out, indicating the value (adjs R2) for the dependent variable carbon emission disclosure of 62.7% means 37.3% variations in the dependent variable are influenced by other variables outside of this study. Then the independent variable used in this study is still classified as less or little.

2. The scope used in this study was only the energy sector company listed on the Indonesia Stock Exchange or the Indonesia Stock Exchange in the period 2019-2022.

Suggestion

1. Subsequent research is recommended to expand the scope of variables to provide a more comprehensive explanation related to the disclosure of carbon emissions, for example by considering aspects of carbon emissions and the effectiveness of company management. Furthermore, it is necessary to determine the weight of the disclosure of carbon emissions based on the priority scale of the level of significance.
2. Researchers are advised to use samples from other industries that have the potential to produce high carbon emissions, including the infrastructure, transportation, basic and chemical industry sectors.
3. In further researchers can expand the observation period and use wider research objects.

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