Determinants of Disclosure of Carbon Emissions Moderated Profitability in Manufacturing Companies on the Indonesia Stock Exchange

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ABSTRACT

Conditions in developing countries show that economic growth positively correlates with environmental damage—manufacturing companies whose operations involve producing and using chemicals that produce carbon emissions. In recent years, enintitusvironmental management issues have become a global concern, especially the issue of climate change which causes geothermal temperatures to rise. This study examines the determinants of company size, leverage, and industry type variables on the disclosure of carbon emissions. The gap in this study lies in the profitability variable as a moderating variable. The quantitative research method is obtaining documentary data through annual reports and financial reports of manufacturing companies listed on the IDX for the 2017-2021 period. Sampling using purposive sampling with a total acquisition of 80 companies. Testing the research data using multiple regression analysis and moderating analysis tests using the absolute difference value approach using SPSS 26 software. The study's results using multiple regression analysis tests show that company size, leverage, and industry type affect the disclosure of carbon emissions.

The results of the moderating analysis test with the absolute difference value approach show that profitability moderates the leverage variable and the type of industry on disclosure of carbon emissions. Then profitability does not moderate the relationship between firm size on disclosure of carbon emissions.

Keywords: company sizes, leverage, industry types, profitability, disclosure of carbon emissions.

INTRODUCTION

Today's competitive business environment requires a company to focus not only on achieving high profitability but also on the assessment and disclosure of corporate environmental impacts, which have taken on enormous dimensions over the decades (Ofoegbu et al., 2018). Management in a company must have special expertise to solve problems that arise in the company (Aditya, 2022). Conditions in developing countries show that economic growth has a positive correlation with environmental damage (Solikhah et al., 2020). In recent years, environmental management issues have become a global concern, especially the issue of climate change, which causes geothermal temperatures to rise. Solikhah & Maulina (2021) stated that the increase in greenhouse gas emissions into the atmosphere, namely carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other gases, has caused the earth's temperature to increase. Forests in Indonesia are gradually being converted into land that produces carbon dioxide gas (Apriliana et al., 2019). Efforts were made to prevent the impact of large economic losses due to environmental damage, namely the existence of the Kyoto Protocol, Irwhantoko & Basuki (2016) stated that with the Kyoto Protocol, the term carbon accounting emerged, which became a guideline for companies in disclosing, recording, and presenting, as well as acknowledging carbon emissions. Carbon emissions produced in Indonesia have an impact on climate change, so in the ratification of Law No. 17 of 2004, Indonesia agreed to participate in reducing emissions (Astiti & Wirama, 2020).

Disclosure of carbon emissions is a means for companies to carry out their responsibility to society to reduce environmental damage arising from operating activities carried out by companies (Dewayani & Ratnadi, 2021). Disclosure of carbon emissions in Indonesia is relatively low for corporate entities. Voluntary disclosure of carbon emissions is a factor in why not all companies disclose emissions in their annual reports (Anisa et al., 2020). Voluntary disclosure is a free choice for management to provide information about companies that are related to report users (Hanifah & Wahyono, 2018). Disclosure of carbon emissions can benefit companies because investors tend to invest in companies with sound business ethics, care about the environment, and have social responsibility (Daromes et al., 2020). Dewi & Yasa (2017) stated that these factors were influenced by business culture, environmental performance, company ownership structure, industry type, leverage, company size, GCG, and profitability. This study examines the impact of company size, leverage, and type of industry on the disclosure of carbon emissions.

Several theories explain environmental disclosures related to the disclosure of carbon emissions, including the legitimacy theory and the stakeholder theory. Legitimacy theory is fundamental for companies in disclosing reports as a form of social and environmental responsibility (Astiti & Wirama, 2020). The company wants legitimacy from the public's point of view that all the company's operating activities have been carried out under applicable norms. The community environment shows that companies are expected to adjust social values that continue to develop from time to time with values that exist in the community so that there is no legitimacy gap between the company and the community (Suhardi & Purwanto, 2015). Stakeholder theory says that a company is not an entity that only operates for its own sake but must benefit its stakeholders (shareholders, creditors, consumers, suppliers, the government, the community, analysts, and other parties) (Jannah & Muid, 2014). Responding to pressure from stakeholder groups, companies tend to engage in environmentally responsible practices and express them through communication channels (Iswati & Setiawan, 2020). The concept of this stakeholder theory is the importance of the role and support of stakeholders in the sustainability of the company (Anisa et al., 2020).

HYPOTHESIS OF RESEARCH

Company size influences the disclosure of carbon emissions.

Company size is a scale to determine the company's size (Sari, 2012). Companies that have a large size get more encouragement from investors and the public to disclose social responsibility information. The larger the scale of a company, the higher the opportunity for the company to express responsibility for the environment. Legitimacy theory explains that large companies receive more pressure from society regarding environmental problems where they operate (Astiti & Wirama, 2020). Company size can describe the number of operational activities, and large companies certainly have more activities where operational activities tend to be directly related to the environment (Kholmi et al., 2020). Thus, the hypothesis proposed is as follows:

H1: Company size has a positive effect on the disclosure of carbon emissions.

Leverage affects the disclosure of carbon emissions.

Leverage is the ratio used to determine how much debt or credit a company has as a source of capital. Companies that produce emissions with high or low levels of leverage must pay attention to aspects of their environmental performance. The level of leverage that affects the disclosure of carbon emissions is in line with stakeholder theory, which emphasizes the importance of considering the interests and needs of the various parties involved. Mujiani et al. (2019) explained that stakeholder theory refers to the economic resources used in disclosing carbon emissions that can be controlled and influenced by company stakeholders. Pranasyahputra et al. (2020) stated that a high level of leverage indicates high creditor power

as one of the stakeholders to put pressure on the company; thus, the hypothesis is proposed as follows:

H2: Leverage has a positive effect on the disclosure of carbon emissions.

The type of industry influences the disclosure of carbon emissions.

The industry type is a company's characteristics related to business fields, risks, employees, and the environment (Pratiwi & Ismawati, 2019). Industry-type variables are grouped into high-profile and low-profile industries. On average, organizations that disclose carbon emissions come from industries whose business activities significantly impact the environment (Ramadhan et al., 2021). High-profile companies, such as mining and manufacturing, which produce environmental damage and high carbon emissions, are more severe than low-profile companies, such as those engaged in services, trade, and so on (Jannah & Muid, 2014). In legitimacy theory, companies engaged in emission-intensive industries generally receive public attention and are under pressure from the government because their operational activities can deal with broad interests (Hapsari & Prasetyo, 2020). Thus, the hypothesis proposed is as follows:

H3: Industry type has a positive effect on the disclosure of carbon emissions.

Profitability moderates company size on the disclosure of carbon emissions

Large companies with enormous resources can provide information faster to external parties (Irwhantoko & Basuki, 2016). The size of a company can be observed by measuring the total value of the company's assets through profitability measurement (Saputra, 2016). Company size shows the number of assets the company owns when measured using company assets. Companies with a larger size are expected to have the opportunity to pay off large amounts of debt compared to small companies because the value of their assets can be used as collateral to gain more trust from investors and banks (Iswati & Setiawan, 2020). This is in line with legitimacy theory, which relates to companies that have a large size and can generate high profits to provide confidence to those who provide capital or invest shares in the company. Thus, the hypothesis proposed is as follows:

H4: Profitability strengthens the effect of company size on the disclosure of carbon emissions.

Profitability moderates leverage on the disclosure of carbon emissions.

With a limited allocation of funds owned, companies must choose to use these funds to pay off all obligations or make voluntary disclosures (Astiti & Wirama, 2020). Stakeholder theory regulates the organisational management of companies; in this case, the level of leverage must be considered carefully because leverage directly affects profitability. The use of debt has a positive impact on funding activities within the company. The high proportion of leverage that is owned creates fixed interest expenses, so there is a decrease in the profitability of the company (Putra & Badjra, 2015). The high profitability achieved by the company will impact the ease with which it can pay its debts. Thus, the hypothesis proposed is as follows:

H5: Profitability weakens the influence of leverage on the disclosure of carbon emissions.

Profitability moderates the type of industry on the disclosure of carbon emissions.

High-profile, more environmentally sensitive companies may face much higher political costs than low-profile companies (Jannah & Muid, 2014). High-profile companies are generally in the public spotlight because their operational activities have the potential to relate directly to the public. This is in line with the theory of legitimacy, in which high-profile companies receive pressure from the public to present carbon emission disclosure reports according to the demands and pressures of the community (Tana & Diana,

2021). A high-profile company has consumer visibility and is consumer-oriented, which will affect sales. *Sales* are an essential criterion in assessing company profitability and are the primary indicator of company activity (Putra & Badjra, 2015). Thus, the hypothesis proposed is as follows:

H6: Profitability strengthens the effect of industrial type on the disclosure of carbon emissions.

METHODOLOGY

This study uses a quantitative approach to test the hypothesis. The population in this study consists of all manufacturing companies listed on the Indonesia Stock Exchange in 2017–2021. Sampling used purposive sampling with the following criteria:

1. Manufacturing sector companies listed on the IDX starting from the 2017-2021 period.
2. Companies publish annual reports or sustainability reports
3. Annual reports and/or sustainability reports are available on the Indonesia Stock Exchange and the respective company websites
4. Companies that explicitly or implicitly disclose carbon emissions (at least one policy related to carbon emissions or carbon emission disclosure items)
5. Annually profitable company

Based on the aforementioned criteria, sixteen manufacturing companies serve as research samples from 80 companies that made up the entire sample from 2017 to 2021. This study collects secondary data through annual reports or sustainability reports accessed through the company's website and annual reports obtained from the Indonesia Stock Exchange's www.idx.co.id page.

The SPSS 26 software was used to test the data. The relationship between the dependent variable and the independent variable is explained through multiple regression analysis testing. Based on the proposed hypothesis, the regression equation has the following formula:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + e$$

Where:

Y = Carbon Emission Disclosure

α = Constant

$\beta 1 - \beta 3$ = Regression Coefficient

X1 = Company Size

X2 = Leverage

X3 = Industry Type

e = Error

While the relationship of the dependent variable to the independent variable with the moderating variable is explained by testing the moderating regression analysis with the absolute difference value approach, based on the proposed hypothesis, the regression equation has the following formula:

$Y = a + \beta 1ZX1 + \beta 2ZX2 + \beta 3ZX3 + \beta 4ZM + \beta 5 \left| ZXI - ZM \right| + \beta 6 \left| ZX2 - ZM \right| + \beta 7 \left| ZX3 - ZM \right| + e$

Where:

Y = Carbon Emission Disclosure

ZX1 = Standardize Company Size

ZX2 = Standardize Leverage

ZX3 = Standardize Industry type

ZM = Standardize Profitability

|ZX1-ZM| = Represents the interaction as measured by the absolute value of the difference between ZX1 and ZM

|ZX2-ZM| = Represents the interaction as measured by the absolute value of the difference between ZX2 and ZM

|ZX3-ZM| = Represents the interaction as measured by the absolute value of the difference between ZX3 and ZM

a = Constant

β = Regression Coefficient

e = Error

RESULT AND DISCUSSION

Table 1 Multiple Regression Analysis Test

Hypotheses H1, H2, and H3 are tested using multiple regression analysis, which measures the effect of company size, leverage, and type of industry on carbon emission disclosure.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.088	.193		-5.633	.000
	Company size	.039	.007	.491	5.755	.000
	Leverage	.155	.058	.232	2.680	.009
	Industry types	.318	.075	.373	4.266	.000

$R^2 = 0.511$

Adjusted $R^2 = 0.492$

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F = 26,466 (Sig 0,000)

From the table above, it is known that the Adjusted R Square value is 0.492. This shows that the variables of company size, leverage, and type of industry can affect the carbon emission disclosure variable by 49.2%. The remaining (100% minus 49.2% = 50.8%) is influenced by other variables not included in this study. The table above shows that the calculated F is 26.466 with a significance of 0.000, which is less than 0.05. The calculated F value obtained is greater than F table 2.34, which is obtained from df1 = 6-1 = 5 and df2 = 80-6 = 74. The results of this calculation indicate that the variables of company size, leverage, and type of industry simultaneously have a positive and significant effect on the disclosure of carbon emissions.

Table 1 from the results of multiple linear regression testing found the estimation model as follows:

$$CED = -1{,}088 + 0{,}039\ X_1 + 0{,}155\ X_2 + 0{,}318\ X_3 + e$$

The equation above shows a constant value of -1.088, indicating that if the variables of company size, leverage, and type of industry are zero, then the disclosure of carbon emissions will occur at -1.088. Suppose the company's size has a regression coefficient of 0.039 and a significance level of 0.000 <0.05. In that case, the variable company size positively affects the disclosure of carbon emissions. Leverage, with a regression coefficient value of 0.155 and a significance level of 0.009 <0.05, positively affects the disclosure of carbon emissions. The industry-type variable with multiple linear regression coefficient values of 0.318 and a significance level of 0.000 <0.05 means that the industry-type variable influences the disclosure of carbon emissions.

The test results show that company size positively affects the disclosure of carbon emissions, so H1 is accepted. The results of this study support the legitimacy theory, which explains that companies with large sizes have more significant pressure on environmental issues than the surrounding community. This encourages companies to voluntarily disclose carbon emissions to gain legitimacy. Large-scale companies will be in the spotlight in the eyes of society compared to small-scale companies. Large-scale companies have adequate resources to disclose the corporate environment. This is corroborated by research by Probosari & Kawedar (2019), which states that large companies have many resources, making them more flexible in disclosing environmental issues than small-scale companies.

The test results show that leverage positively affects the disclosure of carbon emissions, so H2 is accepted. The results of this study support the stakeholder theory, which indicates that the level of corporate leverage will be under pressure in terms of considering stakeholder interests. Stakeholder theory shows that stakeholders can influence the company's funding sources (Jannah & Muid, 2014). Companies with high levels of leverage tend to disclose more total emissions in order to fulfil their responsibilities towards the environment. These efforts can encourage investors to invest their capital, resulting in lower pressure exerted by investors and creditors, reducing agency costs, and responding to conflicts between shareholders and creditors (Winarsih & Supandi, 2020).

The test results show that the type of industry positively affects the disclosure of carbon emissions, so H3 is accepted. The results of this study support the legitimacy theory, which explains that companies with a high profile, such as manufacturing companies, tend to impact the environment. Legitimacy theory encourages companies with high profile levels to make more environmental disclosures because their activities tend to be directly related to the surrounding environment and are also limited by law (Dewi & Yasa, 2017). The high-profile industry is included in the group that produces emissions intensively, so it is under pressure from the public and the government to disclose emissions (Aprilia et al., 2019). The high-profile industry has higher consumer visibility and political risk compared to the low-profile industry, so the manifestation of high-profile companies is to respond to this pressure by disclosing carbon emissions (Hapsari & Prasetyo,

2020).

Table 2 Testing the Moderating Regression Analysis with the Absolute Difference Value Approach

The hypotheses H4, H5, and H6 were tested using a moderating regression analysis with an absolute difference value approach. This test is used for explain the relationship of company size, leverage, and type of industry on carbon emission disclosure, with profitability as the moderating variable.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.247	.222		-1.110	.271
	Zscore (Company Size)	.483	.083	.483	5.792	.000
	Zscore (Leverage)	.095	.087	.095	1.095	.277
	Zscore (Industry type)	.523	.152	.523	3.455	.001
	Zscore (Profitability)	.154	.099	.154	1.563	.122
	X1_Profitability	.188	.113	.151	1.666	.100
	X2_Profitability	-.316	.109	-.239	-2.895	.005
	X3_Profitability	.394	.198	.360	1.991	.050

R^2 = 0.675

Adjusted R^2 = 0.643

F = 21,315 (Sig 0,000)

a. Dependent Variable: Zscore (CED)

Table 2 shows the Adjusted R Square value of 0.643, which means that the relationship between the variables company size, leverage, and type of industry on disclosure of carbon emissions is moderated by profitability having an effect of 64.3% and the rest (100% – 64.3% = 35.7%) influenced by other variables outside the variables studied. Then the F value in Table 2 is 21.315 with a significance of 0.000 <0.05, which indicates that profitability as a moderating variable simultaneously influences company size, leverage, and industry type on disclosure of carbon emissions.

Table 2 from the results of the moderating regression test with the absolute difference value approach found the following estimation model:

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CED = -0,247 + 0,483 + 0,095 + 0,523 + 0,154 + 0,188 X1_Z – 0,316 X2_Z + 0,394 X3_Z + e

The results of the moderation regression analysis using the absolute difference value approach show that the unstandardized beta coefficient value of the firm size variable is 0.188, and (sig.) t is 0.100 > 0.05. That is, profitability does not moderate the relationship between firm size and disclosure of carbon emissions. This shows that H4, which says that company size positively affects the disclosure of carbon emissions moderated by company profitability, is rejected. The size of a company with high profitability does not guarantee the amount of disclosure of carbon emissions (Mustar et al., 2020). Small and large-scale companies with low levels of profitability are a factor that hinders a company from disclosing carbon emissions. Even though it is large, its financial limitations can become an obstacle to a company's management disclosing carbon emissions in detail.

The results of the moderation regression analysis using the absolute difference value approach show that the unstandardized beta coefficient value of the leverage variable is -0.316 and (sig.) t is 0.005 <0.05. That is, profitability moderates the leverage related to the disclosure of carbon emissions. This shows that H5, which says that leverage has a negative effect on the disclosure of carbon emissions moderated by company profitability, is accepted. Negative influence indicates that the higher a company's leverage level, the lower its profitability, and vice versa. High and low leverage are the main factors affecting company profitability (Putra & Badjra, 2015). The high debt ratio owned by the company will allocate the profits received to pay off its obligations to creditors. This is corroborated by research conducted by Astiti and Wirama (2020), which found that a high debt ratio will prioritize paying company obligations to creditors rather than disclosing carbon emissions. The results of this study align with stakeholder theory, which shows that the profitability obtained by companies with high levels of leverage is the company's primary responsibility and puts pressure on them to prioritize fulfilling their obligations to creditors.

The results of the moderation regression analysis using the absolute difference value approach show that the unstandardized beta coefficient value of the industry type variable is 0.394, and (sig.) t is 0.05 ?0.05. That is, profitability moderates the relationship between industry type and disclosure of carbon emissions. This shows that H6, which says that the type of industry positively affects the disclosure of carbon emissions moderated by company profitability, is accepted. The results of this study align with the legitimacy theory, which indicates that the type of industry that produces carbon intensively will receive greater demands from the public to disclose carbon emissions. High profitability can provide incentives and financial capabilities for companies in specific industries to be more focused and committed to better disclosure of carbon emissions. Jannah & Muid (2014) said that manufacturing companies that are more vulnerable to their operational activities in the environment tend to face high political costs. High profitability and a stable financial level in a company can help deal with existing political costs and reduce this political pressure.

CONCLUSION

Based on multiple linear regression analysis and the absolute difference value test, it is shown that during the five-year research period with a total of six hypotheses proposed, five were accepted and one were rejected. Testing multiple regression analyses shows that company size, leverage, and industry type positively affect the disclosure of carbon emissions. Testing the moderating analysis with the absolute difference value approach shows that profitability can moderate the leverage variable and the type of industry on disclosure of carbon emissions. Meanwhile, company size variable show that profitability does not moderate the disclosure of carbon emissions. A company's high or low profitability cannot moderate the variables of company size on the disclosure of carbon emissions. The contribution of this research is to develop a stakeholder theory that explains how companies nowadays are not only concerned with profit but also pay attention to environmental aspects. The limitations of this study include the selection of

profitability as the mediating variable, which cannot moderate the variables as a whole. Therefore, future researchers are expected to choose other variables as moderating variables that have a stronger influence, such as government policy and regulation variables.

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