



# Factors Affecting Disclosure of Carbon Emission in State-Owned Enterprises Listed on the Indonesia Stock Exchange

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**Abstract**—This study aims to obtain empirical evidence of the profitability effect, leverage, company size, industry type, and media exposure on carbon emission disclosures in state-owned enterprises listed on the Indonesia Stock Exchange from 2018 to 2020. The population is 22 companies, and the sample is 15 companies that meet the criteria based on the purposive sampling method. This study is carried out over three years of observation, yielding 45 analyses. The data analysis technique is through descriptive statistical analysis, the classical assumption test, multiple linear regression analysis, and hypothesis testing. The results show that profitability, as measured by the level of ROA, and leverage, as measured by the level of DAR, have a negative and significant effect on the disclosure of carbon emissions. While company size, industry type, and media exposure have no significant effect on the disclosure of carbon emissions.

**Keywords**—*Disclosure of Carbon Emissions, Profitability, Leverage, Company Size, Industry Type, and Media Exposure.*

## I. INTRODUCTION

Carbon emissions disclosure is part of corporate social responsibility (CSR) in the form of environmental disclosure [1]. The importance of carbon emissions disclosure causes stakeholders to look at the company's performance, including its fundamental and environmental performance [2]. Disclosure of carbon emissions can increase a company's value because the company is considered to have a high level of responsibility towards the climate and environment around it [3];[4]. This shows that the market responds to information on carbon emissions disclosure.

Disclosure of carbon emissions is an environmental concern relating to climate change that started during the industrial revolution. Many forests have been turned into industrial land as a result of this phenomenon, affecting the balance of natural resources and ecosystems. This has increased carbon emissions that have increased the temperature of the ground atmosphere.

Accounting is a part of the industrial revolution that cannot be ignored and is thought to be the cause of ecological problems [5]. The contribution of the accounting profession as a transactions recorder and

financial statements issuer must be able to estimate the impact of externalities from business activities and disclose these externalities in financial statements [6]. Externalities are impacts outside the company's activities on society that are divided into two categories: External economies apply if the company's actions lead to an increase in social capital and it is suspected to be an external (social) benefit, namely the company's involvement in the community, and the external diseconomies disclaimer applies when the company's activities lead to a reduction in social capital and are recognized as external costs (Harahap, 1999, in [7]).

Carbon emissions manifest as a global topic because it is contained in the 13th goal of the Sustainable Development Goals (SDGs), in which each country is urged to take action to prevent climate change. Some agreements and policies have been made to mitigate the risk of global warming, starting with the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, the Kyoto Protocol in 1997, the Bali Agreement Roadmap in 2007, and the Paris Agreement in 2015.

The commitment of Indonesian government to act as a regulator and prevent the increase in greenhouse gas by establishing several policies, such as Presidential Regulation No. 61 of 2011 concerning the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) and Presidential Regulation No. 71 of 2011 about the Implementation of the National Greenhouse Gas Inventory. President Joko Widodo announced that Indonesia aims to achieve net zero emissions by 2060 or before. Carbon neutralization or net zero emissions is the process of balancing carbon accumulation by reducing the number of carbon emissions produced over a set period [8].

Regulation of the Minister of Energy, Resources and Minerals No. 22 of 2019 Article 23 explains that energy exploitation activities related to greenhouse gas emissions must be reported by companies to each Organizational Unit within the Ministry that handles Inventory and /or GHG Mitigation in the energy sector, reporting on emissions is carried out no later than May of the current year. Thus, the disclosure of carbon emissions in

Indonesia has become a mandatory disclosure or it is the disclosure that businesses must be reported to the public.

The primary stakeholder of the state-owned companies is the government. The company must continue to build relations with all its stakeholders by giving in to their expectations and interest, especially with those who are more powerful or who have a big impact on the company. As a regulator, the government has full authority over companies, pressing down on them to disclose their carbon emissions and reduce their carbon footprint [9]. Stakeholders have the right to obtain information about the company's activities that affect them. Companies will disclose their carbon emissions more often, the more government ownership they have in the company [10];[11];[12]. The issue of carbon disclosure is interesting to explore because it was found that the results of the study were unstable from earlier studies.

The concept of a "stakeholder" was originally developed by R. Edward Freeman in the 1984 period. He describes stakeholders as "any group or individual who can affect or is affected by the achievement of the organization's objectivism" [13]. Companies are not entities that only operate for their interests, but must provide benefits to their stakeholders [14]. Stakeholders based on their characteristics are divided into two: primary stakeholders are groups or individuals who are directly related to company transactions, such as groups of investors, consumers, employees, and suppliers, and the secondary stakeholders are groups or individuals who are not related to the company's transactions, such as government and communities [15]. According to this definition, stakeholders are objects that relate to various entities' interests and the company's duties or commitments to all its stakeholders.

Carbon emissions are the output of human daily actions [16] and are defined as the release of gasses containing carbon into the Earth's atmosphere over a certain period [17]. Heat or emissions produced from industrial operations need to be reduced because the company's actions are one of the contributors to carbon emissions [18]. Information on reducing GHG emissions requires disclosure. Disclosure of carbon emissions is defined as the company's efforts as business executors who try to be more responsive to the threat of climate change [19].

The content analysis method is used to measure disclosures of carbon emissions. Using this method, the research sample of companies is examined for their sustainability reports. The parameters from the study by Choi et al. (2013), known as the Carbon Disclosure Project (CDP), were adopted in order to examine the extent of carbon emissions disclosure. The index consists of five categories related to carbon emissions and climate change, including climate change (risks and opportunities), greenhouse gas emissions, energy use, greenhouse gas reduction, and costs, and accountability for carbon emissions. There are 18 items on the checklist that need to be identified.

Profitability is a ratio used to evaluate how profitable a company's activities are [21]. The ROA ratio is used because it can explain how efficiently a company uses its assets to generate profits. High profitability can attract the

attention of its stakeholders (investors) in order to gain capital. The results of previous research vary in three ways: (1) the disclosure of carbon emissions is positively and significantly influenced by profitability [9];[11];[20], (2) profitability has a negative and significant impact on carbon emission disclosure [22];[23];[24];[27], (3) profitability does not affect the disclosure of carbon emissions [10];[18];[25]. According to theory and findings from the earlier study, companies with good financial performance could disclose their carbon emissions. So, the first hypothesis is as follows:

H<sub>1</sub>: Profitability affects disclosure of carbon emissions.

Leverage is the company's ability to meet all obligations, both short-term and long-term [26]. Leverage in this study was calculated using the debt-to-asset ratio (DAR). Companies with high leverage will decrease carbon emission disclosure [22];[24];[25]. High leverage indicates that the company has a limited budget or fewer resources and creditors will provide more pressure. Thus, the company is more focused on paying off debts rather than spending costs to disclose carbon emissions. Based on this, the second hypothesis is:

H<sub>2</sub>: Leverage affects disclosure of carbon emissions.

Company size can be seen from the resources owned by a company, the larger the company, the larger its resources [20]. Stakeholder theory explains that bigger companies have higher expectations and more pressure from society, so companies disclose carbon emissions more widely in order to build a positive social image. The larger the size of the company, the greater the resources owned so that the company can also increase carbon emissions disclosure [27];[28];[29]. Another result proved that the company size does not affect the disclosure of carbon emissions [1];[18];[30]. Below is the third hypothesis:

H<sub>3</sub>: Company size affects disclosure of carbon emissions.

Companies with high industry types indicate high emissions such as energy, transportation, materials, and utility sectors [20]. The stakeholder concept explains that if an emission-intensive company leads to more pressure from the community, then the company needs to disclose its carbon emissions in response to the claim. Companies that are dominant in causing damage to nature tend to be broad in their environmental disclosures [9];[25];[30]. The disclosure of carbon emissions is negatively and significantly impacted by the type of industry [18];[27]. The disclosure of carbon emissions is unaffected by the type of industry proved by [29]. Based on the description, the fourth hypothesis can be formulated as follows:

H<sub>4</sub>: Industry type affects disclosure of carbon emissions.

The media is a tool for companies to communicate with stakeholders regarding information and company prospects. Stakeholder theory describes that companies need to be ready to provide benefits to their stakeholders. Media exposure acts to provoke companies to publish their activities not only specifically in the financial performance, but also in environmental performance as well as for positive reactions from society [1];[28];[29]. Different results were found by [9];[18] that media exposure has no effect on the disclosure of carbon

emissions. Based on this, the fifth hypothesis is as follows:

H<sub>5</sub>: Media exposure affects disclosure of carbon emissions.

**II. RESEARCH METHOD**

The population is 22 companies and there are 15 companies that match the sample criteria based on the purposive sampling method. The total data used in the model was from 15 companies over the period of 2018-2020. The reason for choosing the purposive sampling method is to meet the criteria of the sample that can be used on the research variables. Criteria for sample selection are as follows:

1. State-owned company listed on the IDX in 2018-2020.
2. Companies that published complete annual reports and sustainability reports for 2018-2020.
3. Companies that disclosed carbon emissions (at least one policy or regulation related to greenhouse gas emissions).

Multiple regression equation was used in this study:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e \tag{1}$$

Note:

- Y = Carbon emission disclosure
- α = Constanta
- β<sub>1</sub> – β<sub>5</sub> = Regression coefficients
- X<sub>1</sub> = Profitability
- X<sub>2</sub> = Leverage
- X<sub>3</sub> = Company size
- X<sub>4</sub> = Industry type
- X<sub>5</sub> = Media exposure
- e = Residual error

**III. RESULTS AND DISCUSSION**

TABLE I. CLASSICAL ASSUMPTION TEST RESULT

Assumption Test	Value	Result
1. Normality Asymp. Sig. (2-tailed)	0.081	data in this study is normally distributed.
2. Multicollinearity Tolerance		
Profitability	0.401	there is no multicollinearity in this study.
Leverage	0.293	
Company size	0.173	
Industry type	0.178	
Media exposure	0.644	
VIF		
Profitability	2.495	no heteroscedasticity.
Leverage	3.414	
Company size	5.764	
Industry type	5.613	
Media exposure	1.552	
Sig.		
Profitability	0.824	residual data is random and has no autocorrelation.
Leverage	0.649	
Company size	0.352	
Industry type	0.295	
Media exposure	0.584	
4. Autocorrelation Asymp. Sig. (2-tailed)	0.229	

<sup>a</sup>Output SPSS version 26 for windows, 2022

Based on Table 1, the results of the normality test through Kolmogorov-Smirnov show a significance of 0.081 above 0.05, so the regression model in this study is normally distributed. The multicollinearity test found that all independent variables have tolerance values above 0.10 and variance inflation factor (VIF) values below 10, which means all independent variables are not correlated with each other and there is no multicollinearity. The heteroscedasticity test based on the Gletser test found that all independent variables have a significance above 0.05, hence the regression model did not exhibit heteroscedasticity. The autocorrelation test through the run test obtained a significance of 0.229 above 0.05, so it can be concluded that the residual data in this study is random and there is no autocorrelation. All classical assumption tests are fulfilled and continued in the multiple linear regression test.

TABLE II. MULTIPLE LINEAR REGRESSION ANALYSIS AND HYPOTHESIS TESTING RESULT

Independent Variables	Regression Coefficient	T count	Sig.	Hypothesis
Profitability	2.287	-3.561	0.001	H <sub>1</sub> rejected
Leverage	-0.963	-4.229	0.000	H <sub>2</sub> accepted
Company size	0.010	0.239	0.812	H <sub>3</sub> rejected
Industry type	-0.124	-1.018	0.315	H <sub>4</sub> rejected
Media exposure	0.116	2.001	0.052	H <sub>5</sub> rejected
Constanta	= 0.845	F count	= 6.708	
R	= 0.680	F table	= 4.46	
R Square	= 0.462	Sig. F	= 0.000	
Adjusted R Square	= 0.393	T table	= 2.023	

<sup>b</sup>Output SPSS version 26 for windows, 2022

Based on Table 2, the regression equation model used in this study is as follows:

$$Y = 0.845 - 2.287X_1 - 0.963X_2 + 0.010X_3 - 0.124X_4 + 0.116X_5 \tag{2}$$

The constant value (α) of 0.845 indicates that if the independent variable is zero, the disclosure of carbon emissions is 0.845. The regression coefficients for profitability (β<sub>1</sub>), leverage (β<sub>2</sub>), and industry type (β<sub>4</sub>), namely -2.287, -0.963, and -0.124, indicate that there is a negative effect to the extent that every unit change in profitability, leverage, or industry type will reduce the disclosure of carbon emissions by an amount equal to the beta value, assuming the other independent variables are constant. The regression coefficients for company size (β<sub>3</sub>) and media exposure (β<sub>5</sub>), namely 0.010 and 0.116, indicating that there is a positive effect to the extent that every unit change in company size or media exposure will reduce the disclosure of carbon emissions by an amount equal to the beta value, assuming the other independent variables are constant.

The adjusted r square value of 0.393 indicates that the effect of carbon emission disclosure can be explained by the independent variables in this study, but only to a degree of 39.3%, with the remaining 60.7% explained by other independent variables outside the model. The F-test result shows an f-count of 6.708 above the f-table of 2.46 or a significance of 0.000 below 0.05, indicating that the independent variables in this study simultaneously affect

the dependent variable and that the model is feasible, so the discussion is continued with the T-test.

The first hypothesis testing based on the T-test result shows the t-count for profitability is 3.561 above the t-table of 2.023 and a significance level of 0.001 below 0.05, so there is a significant effect. The value of the regression coefficient of -2.287 means that there is a negative effect. Because of the directional difference with the predicted hypothesis, the first hypothesis in this study, “profitability affects disclosure of carbon emissions,” is rejected. It indicates that profitability has a negative and significant effect on the disclosure of carbon emissions. So, the higher the company’s profitability, the smaller the disclosure of carbon emissions.

This evidence refutes the stakeholder theory, which states that the company is not an entity that only operates for its own interests but must provide benefits to its stakeholders. Stakeholders have the right to obtain information about the company’s activities that affect them. Companies with high profitability indicate that they consume more energy and produce more emissions, as well as having healthier financial performance, so the company can make a wider carbon emissions disclosure. The study found that its good monetary performance did not consistently disclose its carbon footprint in its business strategy because the company was more focused on generating profits.

This evidence is in line with [22];[24];[27]. Using costs to reduce emissions and improve energy quality and production processes can increase operating costs and reduce profitability, thereby disrupting the company’s successful financial performance. The Capital Market and Financial Institution Supervisory Agency (BAPEPAM-LK) does not specify environmental disclosure as one of the requirements on the IDX, so companies with high profitability do not try to disclose their carbon emissions [23]. Meanwhile, companies with low profits expand carbon emissions disclosure for legitimacy purposes.

The second hypothesis shows that the t-count for leverage is 4.229 above the t-table of 2.023 and has a significant level of 0.000 below 0.05, so there is a significant effect. The value of the regression coefficient of -0.963 means that there is a negative effect. The second hypothesis in this study, “leverage affects carbon emission disclosure,” is accepted. The negative effect describes how higher leverage in state-owned companies, as proxies by DAR, will reduce disclosure of carbon emissions.

The study’s findings are consistent with the stakeholder concept, which states that the higher the level of leverage, the more pressure the company will get from creditors to fulfill their obligations, namely paying off debts lent by creditors. This study is in line with [22];[24];[25]. Indications of a company with a high leverage value show high credit risk. If done, the disclosure of carbon emissions could potentially raise the post’s operational costs. Hence, information about carbon emissions is less abundant because companies tend to focus more on paying off their obligations.

The third hypothesis tests that the t-count for company size is 0.239 below the t-table of 2.023 and has a significant level of 0.812 above 0.05, so there is no significant effect. So, the third hypothesis in this study, “company size affects disclosure of carbon emissions,” is rejected. It means the scale of companies, large or small, has no impact on the level of carbon emissions disclosure.

The outcomes of this research disagree with the stakeholder concept, according to which a larger company has greater recourse to that as well, making it possible to raise its disclosure of carbon emissions. In establishing a positive reputation and image, a big company must disclose its carbon emissions to the public because they are exposed to huge pressure and public expectations.

The size of the company is not a reason to increase the disclosure of emissions. This evidence is in line with the study of [1];[18];[30]. Big companies are not enthusiastic about disclosing carbon emissions as part of the impact on company performance in the future. Large-scale companies have not looked at the effectiveness of environmental disclosure. Presidential Regulation No. 61 of 2011 and Minister of Energy and Mineral Resources No. 22 of 2019 also do not specifically mention that only large-scale companies are required to disclose carbon emission information. This condition occurs because large-scale companies are more often in the public spotlight. Meanwhile, small-scale companies avoid public attention, which can create a negative stigma if it is known that information on carbon emissions is not disclosed in detail.

The fourth hypothesis shows that the t-count for industry type is 1.018 below the t-table of 2.023 and has a significant level of 0.315 above 0.05, so there is no significant effect. So, the fourth hypothesis, “industry type affects carbon emissions disclosure,” is rejected. Companies categorized as having a high level of carbon emissions do not necessarily mean that their carbon emissions are higher or more publicly disclosed compared to the companies that are not emission intensive.

This result is against the stakeholder theory, according to which high-profile company type leads to more public pressure because the company is blamed for causing environmental damage, and in response to that pressure, the company should disclose carbon emissions. This evidence is consistent with [28]. Even if the company is highly intensive in releasing emissions, it is not forced to publish carbon emissions extensively since the society near the company’s operational operations is not disturbed and does not complain about the company. Industries that produce a lot of emissions but provide less information about their emissions may attract negative attention from the public and the government, which will destroy their reputation.

The fifth hypothesis shows that media exposure has a t-count of 2.001 below the t-table of 2.023 and a significant level of 0.052 above 0.05, so there is no significant effect. It means the fifth hypothesis in this study, “media exposure affects carbon emissions disclosure,” is rejected.

Media exposure has no impact on the disclosure of carbon emissions. The findings contradict the stakeholder theory. As a result of its media exposure, the company's website has an impact on stakeholder decisions because it plays an important role as one of the most effective means and the primary source of CSR information. Companies tend not to take advantage of the role of media pages in giving information about their activities.

This study is in line with the findings of [22];[23];[24]. The use of media exposure has no impact on how companies disclose their carbon emissions. Companies are often concerned about environmental monitoring, which can result in a negative stigma if emission data is found to be inadequate.

#### IV. CONCLUSION

According to the findings of this study, profitability and leverage have a negative and significant impact on the disclosure of carbon emissions in state-owned companies listed on the IDX from 2018 to 2020. Meanwhile, company size, industry type, and media exposure have no effect on the disclosure of carbon emissions in state-owned companies listed on the IDX for the period 2018–2020.

This study has limitations, including the fact that the sample population is limited to state-owned companies listed on IDX, so there will be a possible indication of different evidence if using other companies that are also listed on IDX. The period year is limited to 3 years of observation, namely from 2018–2020, so the data taken may be considered not good enough to see the prospects for the company's carbon emissions disclosure in the long term.

Based on the conclusions and limitations that have been stated, here are some suggestions: (1) for future researchers, it would be better if develop other independent variables that are thought to explain the disclosure of carbon emissions and consider a wider sample, (2) the government should monitor the disclosure of carbon emissions so that companies are more responsible for their business activities to prevent an increase in carbon emissions as regulated in Presidential Regulation No. 61 of 2011 and Indonesia's target of achieving carbon neutralization by 2060.

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