# Determinants of Carbon Emission Disclosure in Non-Financial Companies Listed on IDX

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**Abstract:** According to a report by the Climate Transparency organization, Indonesia is in a critical situation. The organization states that the Indonesian government is not taking adequate steps to meet the Paris Agreement's target of limiting global temperature rise to 1.5°C. As the world's fifth-largest carbon emitter, Indonesia requires concrete actions to reduce its carbon emissions. One approach is to enhance the responsibility and accountability of companies in carbon-intensive industries to disclose their emissions. This study aims to identify the factors influencing carbon emission disclosure. The research uses a population of non-financial sector companies listed on the Indonesia Stock Exchange (IDX) for the period 2021-2023, with 52 samples selected through purposive sampling. Multiple linear regression analysis is applied in this study to examine the relationship between the independent variables and the dependent variable. The results show that firm size affects carbon emission disclosure, while leverage and managerial ownership do not impact carbon emission disclosure.

**Keywords:** Carbon Emission Disclosure, Firm Size, Leverage, Managerial ownership

## Introduction

Recently, social media has been abuzz with the Global Boiling hashtag. This phrase gained traction following a statement by the United Nations Secretary-General, Antonio Guterres (Rachman, 2023). He remarked that the summer of 2023 is the harshest on record, presenting a significant issue for the planet. Observations by the National Aeronautics and Space Administration (NASA) indicate that since 1880, Earth's temperature has risen by 1.4° C (NASA, 2024). Furthermore, the World Meteorological Organization (WMO) reports that July 2023 was the hottest month in 120,000 years (acciona, 2023). The European Commission (2024) attributes the current climate situation primarily to greenhouse gases, including naturally occurring ones such as carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), and chlorofluorocarbons (CFCs). However, human activities like deforestation, fossil fuel usage, and industrial expansion are increasing these gases in the atmosphere (European Commission, 2024; Putri Halimah & Yanto, 2018).

Indonesia ranks as one of the world's largest carbon emitters. According to the Statistical Review of World Energy (2023), Indonesia is 5th among the top ten countries for $CO_2$ emissions from energy emissions, flaring, and gas emission equivalents, including methane and industrial processes. In 2022, Indonesia's carbon dioxide emissions surged to 839.6 million tonnes, from 557.3 million tonnes in 2021.

To address this, the Indonesian government has initiated a carbon market, marked by the issuance of Presidential Regulation 98/2021 on the Economic Value of Carbon. This regulation introduces carbon trading as a method to reduce emissions, allowing carbon-intensive entities to purchase carbon credits from other entities (Tumiwa et al., 2023).

Another approach to tackle this issue is through carbon emission disclosure in sustainability reports. These reports, published periodically by companies, inform stakeholders about the company's performance and its impact in the sustainability context (Anggi, 2020). Sustainability reports help companies consider non-financial issues, such as customer service and climate change, and their effects on value creation (ACCA, n.d.). Indonesia's Financial Services Authority has mandated the preparation and publication of Sustainability Reports by business entities and public companies (Regulation Number 51/POJK.03/2017 Article 10, paragraph 1.

However, there are no specific regulations in Indonesia detailing the components that must be disclosed in sustainability reports, including carbon emissions. Companies in carbon-intensive sectors are encouraged to disclose their emissions as part of the government's commitment to sustainable development goals (Nasih et al., 2019). Simamora et al. (2022) note that voluntary disclosure of carbon emissions adds value for investors, both domestic and international.

The Global Reporting Initiative (GRI) was established in 1997 in response to the 1989 Exxon Valdez oil spill. GRI aims to develop accountability mechanisms ensuring companies adhere to environmental responsibility principles, later expanded to include social, economic, and governance aspects (Global Reporting Initiative, n.d.). The first GRI Guidelines (G1) were issued in 2000, followed by G2 in 2002, G3 in 2006, and G4 in 2013, with continuous updates to address growing demand for GRI standards. Today, many companies use GRI Standards in their sustainability reports (Ekasari et al., 2021). According to PWC's 2023 Asia Pacific Report Sustainability Counts II, 80% of Indonesian companies studied in 2022 used GRI Standards (PWC, 2023)

Climate Transparency has criticized Indonesia for not adequately adhering to the Paris Agreement goals of limiting temperature rise to a maximum of 1.5°C. Their evaluation categorizes Indonesia's climate policies and actions as "very inadequate," contributing to increased carbon emissions rather than reducing them, and inconsistent with the Paris Agreement (Climate Transparency, 2022).

Research on the determinants of carbon emission disclosure shows mixed results. Wibowo et al. (2022) found that firm size positively influences carbon emission disclosure, while Putri Halimah and Yanto (2018) found a negative effect. Hapsari and Prasetyo (2020) identified a negative correlation between leverage and carbon emission disclosure, suggesting that companies with lower leverage are more likely to disclose emissions.

However, Wahyuningrum et al. (2022) found no significant relationship between leverage and carbon emissions. Similarly, Budiharta and Kacaribu (2020) found a positive correlation between managerial ownership and carbon emissions disclosure, while Solikhah et al. (2021) found no significant relationship.

## Research Method

This study use quantitative secondary data, obtained from the Indonesian stock exchange (IDX) and the company's official website for the 2021-2023 period. In this research, author will use the purposive sampling method or also known as judgmental sampling. This technique focuses on using several criteria in selecting samples from the population (Purwohedi, 2022). The criteria for determining the sample in this study are as follows:

A. Industrial, infrastructure, basic materials, energy, and transportation and logistics sector companies registered on the IDX

B. Industrial, infrastructure, basic materials, energy, and transportation and logistics sector companies that publish annual reports and sustainability reports for the 2021-2023 period

C. Companies in the industrial, infrastructure, basic materials, energy, and transportation and logistics sectors that have used GRI 305:EMISSION as the standard for disclosing their carbon emissions

Starting with the population of 305 companies, the sample was narrowed down to 52 companies. Since the research utilized 3 years worth of data, this resulted in 156 observations. The dependent variable, carbon emission disclosure, was assessed using a checklist derived from 10 indicators based on GRI 103 and GRI 305, which were adaed and modified from Kartikasary et al. (2023). Each company received a score of 1 for each disclosure, with a maximum possible score of 10. The 10 indicators consist of:

1. Disclosure 101-1 Explanation of the material topic and its Boundary
2. Disclosure 103-2 The management approach and its components
3. Disclosure 103-3 Evaluation of the management approach
4. Disclosure 305-1 Direct (Scope 1) GHG Emission
5. Disclosure 305-2 Energy indirect (Scope 2) GHG emission
6. Disclosure 305-3 Other indirect (Scope3) GHG emission
7. Disclosure 305-4 GHG emission intensity
8. Disclosure 305-5 Reduction of GHG emission
9. Disclosure 305-6 Emission of ozons-depleting substance (ODS)
10. Disclosure 305-7 Nitrogen oxide (Nox), sulfur exides (SOx), and other significant air emissions

The independent variable, firm size, is represented by the natural logarithm of total assets, a method commonly used by previous researchers (Desai, 2022; Kartikasary et al., 2023; Pratiwi et al., 2021; Putri Halimah & Yanto, 2018; Wahyuningrum et al., 2022). This proxy is chosen to minimize extreme value comparisons between companies with larger and smaller total assets (Mustika, 2017).

For leverage, the Debt-to-Asset Ratio (DAR) is used to measure a company's leverage by comparing its total debt to its total assets (Aulia Nastiti, 2022). This proxy is a widely acceed ratio and standard indicator for assessing a company's leverage level. DAR reflects the proportion of assets funded by debt, providing insight into the company's operational funding policy and financial risk. This ratio has been validated by many previous researchers.

Managerial ownership is measured by the ratio of shares owned by managers to the total outstanding shares (Simamora et al., 2022). This indicator is crucial for analyzing a company as it helps assess the management's interest and influence. This method has also been used by previous researchers (Budiharta & Kacaribu, 2020).

The data analysis includes descriive statistical analysis, classical assumion test, and hypothesis testing.

## Stakeholders Theory

Stakeholder theory asserts that corporate goals are not only limited to developing financial means for investors, but also supports broader social interests in society (Ufere & Aliagha, 2016). This conce was first introduced by Robert Edward Freeman in 1984, whom emphasized that organizational management must consider aspects of business ethics and moral values in managing the company (Wibowo et al., 2022). This theory takes the point of view that the company is not an entity that only benefits itself but must also provide benefits to the parties related to it (Nasih et al., 2019). The main goal of stakeholder theory is to help company management increases value creation from its activities, while minimizing losses for stakeholders (Wibowo et al., 2022).

## Legitimacy Theory

In legitimacy theory conce, organization will ensure that the activities carried out are in line with social norms (Dowling & Pfeffer, 1975). It is an effort to legitimize, which is a part of a process for a company to acquire trust and recognition to maintain its existence. Harmony between the company and the values held by its stakeholders become very important, because differences in this regard can threaten company's legitimacy (Ratmono et al., 2021). A previous study also showed that the company can ensure its legitimacy by meeting public expectations through their outcomes, thereby reducing the possibility of threats of demands from the public (Widiyani Ardita, 2022). In other words, through legitimacy theory, companies can strengthen relationships with stakeholders interests, such as consumers, employees, government, creditors, organizations environment, and the general public.

## Firm Size and Carbon Emission Disclosure

Firm size is an indicator that reflects the amount of resources owned by a business entity (Putri Halimah & Yanto, 2018). The amount of these resources can be seen through the amount of equity, sales, or total assets of the company (Hariswan et al., 2022). The larger the size of the company, the more resources available to support and influence operational

activities and decision making within the company. Thus, firm size becomes important in assessing the capacity and potential of a company.

In the context of the relationship between firm size and carbon emissions disclosure, legitimacy theory can explain how companies use their size as a tool to shape public perceions about their commitment to environmental sustainability. Larger companies tend to have more resources and infrastructure to monitor and reduce their carbon emissions. Thus, according to Putri Halimah and Yanto (2018), they have a tendency to disclose their carbon emissions.

Aside from that, firm size can also influence the external pressure that companies face in disclosing carbon emissions, where larger companies will face greater pressure (Ratmono et al., 2021). In response to this pressure, large companies tend to increase their carbon emission disclosures in an effort to gain their legitimacy in accordance with the social norms (Nasih et al., 2019). On the other hand, larger companies tend to be more aware of their environmental responsibilities and are willing to disclose information about their carbon emissions voluntarily (Firmansyah et al., 2021).

Previous research shows that firm size has an influence on carbon emissions disclosure (Hariswan et al., 2022; Putri Halimah & Yanto, 2018; Ratmono et al., 2021; Susilawati et al., 2022). In addition, more specifically, several other researchers found that firm size positively and significantly influences the level of carbon emissions disclosure, in line with legitimacy theory which states that larger companies tend to be more active in proving and maintaining their legitimacy, including through carbon emissions disclosure (Aryanti & Hidayat, 2023; Aulia Nastiti, 2022; Saiwi, 2019; Wahyuningrum et al., 2022). However, this result is in contrast to the results of other studies which did not find a correlation between these two variables (Hariswan et al., 2022; Pratiwi et al., 2021; Putri Halimah & Yanto, 2018; Susilawati et al., 2022).

H1: Firm size influences carbon emission disclosure

**Leverage and Carbon Emission Disclosure**

Leverage or company debt policy, refers to the level of debt a company has to fund its activities. Putri Halimah and Yanto (2018) stated that the higher a company's leverage ratio, the greater the debt that the company has. In basic accounting conces, it is often said that debt is a liability. Therefore, the size of a company's debt reflects the size of the company's obligations that must be accounted for, which can greatly influence decision making in a company.

Because in Indonesia there are no regulations governing the disclosure of carbon emissions, legitimacy theory explains that companies with high leverage are more likely to prioritize fulfilling their financial obligations compared to voluntarily disclosing carbon emissions. This is caused by the company's need to use limited financial resources efficiently, one of which is by completing its financial obligations first.

Research conducted by Desai (2022), Hapsari and Prasetyo (2020), Koeswandini and Kusumadewi (2019), Prado-Lorenzo et al. (2009), Ratmono et al. (2021), and Wibowo et al. (2022), found that leverage has a significant negative impact on the level of carbon emission

disclosure. Legitimacy theory explains that the higher the level of company leverage, the lower the possibility of the company to disclose its carbon emissions because the company will focus its attention on its obligations first. Meanwhile, on the contrary, Firmansyah et al. (2021) found that leverage had a positive effect on carbon emissions. Lastly, findings from other researchers show that there is no influence of leverage on carbon emissions disclosure (Hariswan et al., 2022; Riantono & Sunarto, 2022; Saiwi, 2019; Seriyawati & Anisah, 2019; Wahyuningrum et al., 2022; Widiyani Ardita, 2022).

H2: Leverage influences carbon emission disclosure

## Managerial Ownership and Carbon Emission Disclosure

Managerial ownership refers to share ownership by a manager in the company where they work. This is important to discuss because basically, management who also act as shareholders will tend to be more responsible for the growth and sustainability of the company (Budiharta & Kacaribu, 2020). This is in line with the conce of stakeholder theory which states that managers have an obligation to pay attention to the interests of all company stakeholders, not just shareholders.

By owning company shares, managers will be more directly involved in company decisions and have incentives that are in line with the company's long-term goals. Furthermore, this theory also emphasizes that the goal of a company is not only limited to developing value for investors but also to support broader social interests in society (Ufere & Aliagha, 2016). Budiharta and Kacaribu (2020) explained that the greater the managerial ownership of a company, the greater the disclosure of carbon emissions. This is because managers have a long-term interest in the company's activities so they will try to pay attention to non-financial factors such as the environmental impact caused by the company.

However, unfortunately the research results found by Darlis et al. (2020), Simamora et al. (2022), and Solikhah et al. (2021) is not in line with this conce. These studies found that managerial ownership does not influence a company's carbon emissions disclosure. However, other previous research agrees with this, stating that managerial ownership influences firm value (Budiharta & Kacaribu, 2020; Wibowo et al., 2022). This is because the proportion of shares owned by managers can influence policies and decision making in the company.

H3: Managerial Ownership and carbon emission disclosure

## Result and Discussion

**Table 1.** Descriptive Statistics Analysis Results

| Descriptive Statistics | | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| Total Assets | Min | 350,928,680,760 | 351,091,425,626 | 345,923,104,863 |
| | Max | 367,311,000,000,000 | 413,297,000,000,000 | 445,679,000,000,000 |
| | Mean | 35,528,739,521,179 | 41,059,519,919,009 | 42,813,118,873,238 |
| | Std Dev | 65,800,718,023,128 | 72,586,865,167,018 | 76,684,485,444,730 |
| Firm Size (FS) | Min | 26.58385 | 26.58431 | 26.56948 |
| | Max | 33.53723 | 33.65519 | 33.73062 |

| Descriptive Statistics | | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| | Mean | 30.13545 | 30.27203 | 30.29760 |
| | Std Dev | 1.52401 | 1.56453 | 1.57950 |
| | Companies With Above-Average size (%) | 46% | 48% | 48% |
| Total Liabilities | Min | 121,135,854,886 | 183,686,914,070 | 178,077,417,083 |
| | Max | 151,696,000,000,000 | 169,577,000,000,000 | 195,261,000,000,000 |
| | Mean | 17,938,903,011,721 | 19,721,816,007,079 | 20,576,095,918,185 |
| | Std Dev | 30,793,357,700,943 | 32,908,427,723,730 | 35,649,898,554,744 |
| Leverage (LEV) | Min | 0.04044 | 0.11279 | 0.11153 |
| | Max | 1.40373 | 1.35267 | 1.14855 |
| | Mean | 0.49161 | 0.47910 | 0.47363 |
| | Std Dev | 0.23475 | 0.22126 | 0.21392 |
| | Companies With Above-Average Leverage (%) | 50% | 50% | 48% |
| Shares Owned by Managers | Min | - | - | - |
| | Max | 3,961,929,105 | 3,957,929,105 | 3,957,929,105 |
| | Mean | 140,957,351 | 144,183,443 | 153,404,824 |
| | Std Dev | 581,736,315 | 581,542,584 | 584,766,379 |
| Total Outstanding Shares | Min | 151,200,000 | 151,200,000 | 151,200,000 |
| | Max | 129,112,387,720 | 371,320,676,795 | 371,320,705,024 |
| | Mean | 18,675,975,748 | 25,332,653,138 | 26,282,492,059 |
| | Std Dev | 28,035,432,281 | 56,851,689,462 | 56,914,196,483 |
| Managerial Ownership | Min | - | - | - |
| | Max | 0.13909 | 0.13215 | 0.12817 |
| | Mean | 0.01085 | 0.01058 | 0.01054 |
| | Std Dev | 0.03158 | 0.03120 | 0.03072 |
| | Companies With Above-Average Managerial Ownership (%) | 15% | 15% | 15% |
| Carbon Emission Disclosure (CED) | Min | 1 | 1 | 1 |
| | Max | 10 | 8 | 7 |
| | Mean | 6 | 5 | 5 |
| | Std Dev | 2.27013 | 1.85646 | 1.84168 |
| | Companies With Above-Average | 35% | 33% | 42% |

| Descriptive Statistics | 2021 | 2022 | 2023 |
|---|---|---|---|
| Carbon Emission Disclosure (%) | | | |

## Firm Size *(FS)*

**Table 1.** presents a descriive analysis of the total assets and firm size, measured by Ln (Total Assets), from 2021 to 2023. The data shows that the maximum and minimum values of total assets in the non-financial sector have increased, indicating asset growth driven by business activity, additional capital, acquisitions, or improved efficiency. Astra Internasional Tbk (ASII) consistently held the highest total assets, with the increases of 15% in 2022 and 5% in 2023, while Tira Austenite Tbk (TIRA) had the lowest assets for three consecutive years. The largest growth was observed in Merdeka Copper Gold Tbk (MDKA) in 2023, with a 234% increase in total assets from 2022 to 2023. The analysis also highlights a widening gap between companies with the largest and smallest assets, as evidenced by the increasing standard deviation. A similar pattern is seen in firm size, with ASII being the largest and TIRA the smallest, though the standard deviation fluctuated, rising in 2022 and falling in 2023. The same table also presents a positive trend in average total assets and firm size, with an increasing percentage of companies exceeding the average size—from 46% in 2021 to 48% in both 2022 and 2023—indicating overall growth in the non-financial sector.

## Leverage *(LEV)*

**Table 1.** provides a descriptive analysis of total liabilities, total assets, and leverage measured by the debt-to-asset ratio (DAR) from 2021 to 2023. Astra Internasional Tbk (ASII) consistently had the highest total liabilities, driven by increased long-term liabilities for various financial needs. Conversely, the lowest total liabilities fluctuated, with Mitrabahtera Segara Sejati Tbk (MBSS) having the lowest in 2021 at Rp 121 billion, rising to Rp 183 billion for Tira Austenite Tbk (TIRA) in 2022, and dropping to Rp 178 billion in 2023. Total assets increased overall, with Merdeka Copper Gold Tbk (MDKA) seeing a significant 234% rise in 2023. ASII and TIRA consistently held the highest and lowest total assets positions, respectively, with a widening gap indicated by increasing standard deviation.

Leverage, measured by DAR, fluctuated during the period, influenced by the uneven growth of total assets and liabilities. The table shows that the average of both total liabilities and total assets increased, with total assets rising 16% and total liabilities rising 10% in 2022, which both increased by 4% in 2023. This resulted in a declining of the average of DAR, suggesting efforts to reduce debt or investment. The percentage of companies with above-average DAR decreased from 50% in 2021 and 2022 to 48% in 2023, indicating a trend towards lower leverage. However, some companies, like Timah Tbk (TINS), had higher DAR due to asset decrease and liability increase in 2023, which were influenced by a 16% drop in global tin prices, a 26% reduction in tin ore production, and a 31% decrease in sales (Binekasri, 2024).

**Managerial Ownership** *(MO)*

**Table 1.** presents a descriive statistical analysis of shares owned by managers, total shares outstanding, and managerial ownership from 2021 to 2023. Adaro Energy (ADRO) had the highest managerial shares, with 3,961,929,105 shares in 2021, slightly decreasing to 3,957,929,105 shares in the following years. Among the 156 observations, some companies had no managerial ownership. The standard deviation for shares owned by managers remained constant in 2021 and 2022, with a slight increase in 2023, indicating significant variation.

Adaro Energy (ADRO) also had the highest total shares outstanding in 2021, with 129,112,387,720 shares, which increased significantly in 2022 and 2023 to 371,320,676,795 shares for Avia Avian (AVIA). Jembo Cable Company (JECC) had the lowest shares outstanding for three consecutive years, with 151,200,000 shares. The standard deviation for total shares outstanding increased in 2022 and remained stable in 2023, showing greater variation.

Managerial ownership showed a declining trend in the highest values over the study period. Some companies, such as Bumi Resources Minerals (BRMS), had zero managerial ownership. The standard deviation for managerial ownership also declined, indicating a decreasing variation of data each year.

The table also highlights the average shares owned by managers, total shares outstanding, managerial ownership, and the number of companies with above-average managerial ownership. The average shares owned by managers increased, indicating more managers owning shares in the non-financial sector. Total shares outstanding rose by 26% in 2022, suggesting more investor opportunities. The average managerial ownership and the percentage of companies with above-average managerial ownership remained stable at 10% and 15%, respectively, over the study period.

**Carbon Emission Disclosure**

**Table 1.** presents the descriptive statistical analysis of the Carbon Emission Disclosure (CED) variable from 2021 to 2023, revealing an interesting pattern. The highest CED values show a declining trend: 10 in 2021, 8 in 2022, and 7 in 2023, while the minimum value remained constant at 1 for each period. The standard deviation remained unchanged, indicating insignificant data variation. This low standard deviation across all years suggests that most companies' carbon emission disclosures were similar to the average. The analysis highlights changes in reporting practices or corporate responses to carbon disclosure issues over the years, and potential shifts in awareness or regulations affecting corporate sustainability reporting.

The same table also shows the average carbon emission disclosure and the percentage of companies disclosing above-average emissions. The average CED slightly decreased from 6 in 2021 to 5 in 2022 and 2023. Despite a 2% drop in companies disclosing above the industry average in 2022, the number rose significantly in 2023, with 42% of companies reporting more carbon disclosure items than the sector average. This trend suggests that most non-financial sector companies in Indonesia are becoming increasingly aware of

environmental policies in their business operations.

## Classical Assumption Test

The classical assumption test is needed in multiple linear regression analysis based on Ordinary Least Square. The aim is to ensure that the regression equation used is appropriate, valid, and free from deviations from assumions (Aditiya et al., 2023).

## Normality Test

The normality test evaluates whether data in a regression equation is normally distributed, essential for accuracy. Methods like the Kolmogorov-Smirnov test are used. If the significance value exceeds 0.05, the data is deemed normally distributed. This research obtained a significance value of 0.200, indicating normal distribution.

## Multicollinearity Test

The multicollinearity test identifies correlations between independent variables. A robust regression model should be free from multicollinearity issues. This research utilized Tolerance (TOL) and Variance Inflation Factor (VIF) values, with criteria for no multicollinearity being TOL > 0.01 and VIF < 10. Results indicated that all independent variables, including Firm Size (X1), Leverage (X2), and Managerial Ownership (X3), met these criteria, confirming no multicollinearity.

## Heterokedasticity Test

The heteroscedasticity test checks for unequal residual variance across observations in a regression model. A good regression model exhibits homoscedasticity, where residual variance is constant across observations. This research used the Spearman rank method, correlating independent variables with their residual values. Homoscedasticity is indicated by a significance value above 0.05. The test results showed significance values above 0.05 for all variables, indicating that all independent variables in this research are free from heteroscedasticity symptoms.

## Autocorellation Test

The final classical assumption test evaluates the presence of correlation between errors in period t and period t-1 in a regression model. This research employs the Durbin-Watson method with K = 3 (number of independent variables) and dU = 1.7776 (upper limit). The criterion for no autocorrelation is if dU < DW < 4 – dU. This study obtained a Durbin-Watson value of 2.093 (n = 156, K = 3, dU = 1.7776, and 4 – dU = 2.2224). Since the DW value lies between dU and 4 – dU, the regression model shows no symoms of autocorrelation.

## Hypothesis Testing

In this research, the t test or partial test is used to test the effect of each independent variable (separately) on the dependent variable. This test is carried out by looking at the significance number. If the value of Sig. < 0.05 then the independent variable influences the

dependent variable and vice versa if the Sig. > 0.05 then the independent variable does not affect the dependent variable.

**Table 2.** T Testing Results

Coefficientsᵃ

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -9.644 | 2.765 | | -3.488 | 0.001 |
| | Firm Size | 0.484 | 0.091 | 0.395 | 5.304 | 0.000 |
| | Leverage | 39.000 | 0.313 | 0.105 | 1.402 | 0.163 |
| | Managerial Ownership | -5.431 | 3.976 | -0.102 | -1.366 | 0.174 |

Source: data processed by researcher (2024)

The following is an analysis of **Table 2** which describes the t test results:

A. Firm size (FS) influences carbon emission disclosure (CED). This can be seen from the acquisition of a significance value for the FS variable for the CED variable of 0.000. With a Sig value. < 0.005, it can be concluded that FS influences CED and **Hypothesis 1 is accepted.**

B. Leverage (LEV) does not affect carbon emissions disclosure (CED). This can be seen from the acquisition of a significance value for the LEV variable for the CED variable of 0.163. With a Sig value. > 0.005, it can be said that LEV does not affect CED and **Hypothesis 2 is rejected.**

C. Managerial ownership (MO) influences carbon emission disclosure (CED). This can be seen from the obtained MO significance value for the CED variable of 0.174. With a Sig value. > 0.005, it can be said that MO does not influence CED and **Hypothesis 3 is rejected.**

**The Influence Of Firm Size On Carbon Emission Disclosure**

This study supports the hypothesis that firm size influences carbon emission disclosure. The t-test results indicated a significant correlation (Sig. < 0.05) between firm size and the level of carbon emission disclosure. Larger companies tend to have higher carbon emission disclosure values. For instance, in 2021, Perusahaan Gas Negara Tbk (PGAS), with a size of 32.5501, had the highest carbon emission disclosure value of 10, while Tira Austenite Tbk (TIRA), with a smaller size of 26.5835, had a disclosure value of only 2. This trend remained consistent in subsequent years, with large companies such as PGAS and Aneka Tambang (ANTM) continuing to exhibit high levels of carbon emission disclosure in 2023.

This consistency underscores the notion that larger companies, due to their greater resources and stakeholder interests, are more inclined to invest in environmental initiatives and disclose their carbon emissions more extensively. More than half (51%) of the companies with above-average size also had above-average carbon emission disclosure

levels, reinforcing the findings of previous studies by Aryanti & Hidayat (2023) and Aulia Nastiti (2022). Additionally, Vale Indonesia Tbk (INCO) showed an increase in carbon emission disclosure from 7 in 2021 to 8 in 2022, further indicating that as companies grow, their carbon emission disclosures also increase. Conversely, smaller companies like Lion Metal Works Tbk (LION) and TIRA maintained low disclosure levels throughout the study period.

Larger companies typically have more resources to allocate towards environmental initiatives, making them more capable of comprehensive carbon emission disclosures. Additionally, the greater number of stakeholders involved in larger companies, including those with interests in environmental performance, likely exerts pressure on these companies to enhance their carbon emission disclosures. This finding aligns with the legitimacy theory, suggesting that larger companies use their size to influence public perception of their environmental sustainability efforts, including carbon emission disclosures.

**The Influence Of Leverage On Carbon Emission Disclosure**

The hypothesis that leverage affects carbon emission disclosure was not supported by the t-test results, which showed a significance value greater than 0.05. Leverage, or the level of debt a company uses to finance its operations, often leads companies to prioritize debt repayment over environmental initiatives such as carbon emission disclosure (Firmansyah et al., 2021). However, some companies might still disclose carbon emissions to maintain legitimacy, despite high leverage.

The study found no consistent pattern linking leverage to carbon emission disclosure. Among the 156 observations, 50% displayed varied data without a clear positive or negative trend. For instance, Gunung Raja Paksi Tbk (GGRP) and Vale Indonesia Tbk (INCO) had fluctuating leverage from 2021 to 2023, but their carbon emission disclosure remained constant at 4 and 7, respectively. The average company leverage decreased from 2021 to 2023, while average carbon emission disclosure remained steady in 2022 and 2023. The percentage of companies with above-average leverage was 50% in 2021 and 2022, dropping to 48% in 2023. Meanwhile, the percentage of companies with above-average carbon emission disclosure fluctuated (35% in 2021, down 2% in 2022, up 9% in 2023). Thus, no pattern connects leverage with carbon emission disclosure.

These findings align with those of Hariswan et al. (2022), Riantono & Sunarto (2022), and Saiwi (2019), who also found that leverage does not influence carbon emission disclosure. According to (Seriyawati & Anisah, 2019), companies with any leverage are cautious about voluntary carbon emission disclosures due to the potential increase in operational costs and financial burdens. This study's results suggest that leverage does not play a significant role in influencing carbon emission disclosure practices among companies.

**The Influence Of Managerial Ownership On Carbon Emission Disclosure**

The hypothesis that managerial ownership affects carbon emission disclosure was also rejected, as indicated by a t-test significance value greater than 0.05. Managerial ownership refers to the shares owned by management within their company, which theoretically should align management's interests with the company's performance, including environmental responsibilities. However, this study found no significant influence of managerial ownership on carbon emission disclosure, consistent with stakeholder theory. This theory suggest that companies should consider the interests of all stakeholders, not just shareholders (Donaldson & Preston, 1995).

Out of 156 observations, 40% showed varied data without a clear pattern. For example, Archi Indonesia Tbk (ARCI) and Avia Avian Tbk (AVIA) showed no consistent trend in managerial ownership or carbon emission disclosure from 2021 to 2023. The average managerial ownership decreased from 2021 to 2023, while average carbon emission disclosure remained constant in 2022 and 2023. The percentage of companies with above-average managerial ownership remained steady at 15% (8 out of 52 sample companies) throughout the study period, while those with above-average carbon emission disclosure fluctuated (35% in 2021, down 2% in 2022, up 9% in 2023). Thus, no pattern connects managerial ownership with carbon emission disclosure.

These findings are in line with Solikhah et al. (2021) who also found that managerial ownership does not influence carbon emission disclosure. Managers may prioritize overall financial performance over environmental disclosures, seeking to maximize personal gains linked to company performance. This study suggests that factors other than managerial ownership, such as regulatory pressure and stakeholder demands, might have a more significant impact on carbon emission disclosure practices.

**Conclusion**

This study concludes that firm size significantly impacts carbon emission disclosure, with larger companies disclosing more due to greater resources and stakeholder pressure, supporting the legitimacy theory. Leverage and managerial ownership did not significantly affect carbon emission disclosure, suggesting that regulatory requirements and stakeholder expectations are more influential. These findings highlight the importance of firm size while indicating that leverage and managerial ownership are less crucial. Companies should leverage their size and resources to meet stakeholder expectations and regulatory demands, enhancing transparency and accountability, ultimately contributing to sustainable business practices and a greener future. Researchers identified several limitations in this study, including the limited three-year observation period. Future research should extend this period to seven years (2017-2023) to compare data before, during, and after COVID-19. Additionally, incorporating other independent variables, such as profitability, green investment, and industry type, could provide a more comprehensive explanation of carbon emission disclosure. Expanding the scope and duration of research will offer deeper insights

into the factors influencing corporate environmental reporting, enhancing the robustness and applicability of findings in promoting sustainable business practices.

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