Associations Between Government Ownership, Leverage, Media Exposure, Environmental Performance, and Carbon Emission

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ABSTRACT

This study seeks to provide empirical evidence on the impact of government ownership, leverage, media exposure, and environmental performance on carbon emission disclosure. The research focuses on energy sector companies listed on the IDX from 2018 to 2022. The sample was selected using purposive sampling, resulting in eight companies and 40 observations. Multiple linear regression analysis reveals that media exposure positively influences carbon emission disclosure, while government ownership, leverage, and environmental performance show no significant effects. These findings support legitimacy theory, indicating that companies with greater media exposure are more transparent in their carbon emission reporting.

Keywords: *Carbon emission disclosure; government ownership; leverage; media exposure; environmental performance.*

Pengaruh Government Ownership, Leverage, Media Exposure, dan Kinerja Lingkungan pada Carbon Emission Disclosure

ABSTRAK

Penelitian ini bertujuan untuk memperoleh bukti empiris pengaruh government ownership, leverage, media exposure, dan kinerja lingkungan pada carbon emission disclosure. Penelitian ini dilakukan pada perusahaan sektor energi yang terdaftar di BEI periode 2018-2022. Pemilihan sampel menggunakan metode purposive sampling dan diperoleh 8 perusahaan sampel dengan 40 amatan. Dengan menggunakan analisis regresi linier rerganda, hasil penelitian menunjukan bahwa media exposure berpengaruh positif pada carbon emission disclosure, sedangkan government ownership, leverage, dan kinerja lingkungan tidak berpengaruh pada carbon emission disclosure. Implikasi dari penelitian ini membuktikan teori legitimasi yang menjelaskan variabel media exposure dimana perusahaan yang lebih sering diliput media cenderung lebih transparan dalam melaporkan carbon emission disclosure.

Kata Kunci: Carbon emission disclosure; government ownership; leverage; media exposure; kinerja lingkungan.

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INTRODUCTION

In recent years, climate change has emerged as a critical environmental issue and a global concern due to its profound impacts on socio-economic structures, health, infrastructure, and all aspects of human life (Alfani & Diyanty, 2020). Unchecked global climate change has resulted in global warming, with Earth's temperature increasing by 1.0°C over the past three decades. This rise is projected to reach 1.5°C between 2030 and 2052 (Utami, 2022). The primary driver of global warming is the increase in greenhouse gas (GHG) emissions in the atmosphere, largely due to human activities such as industrial expansion, fossil fuel combustion, and deforestation. Natural events like volcanic eruptions also contribute to the escalation of GHG emissions. Carbon dioxide (CO2) is the predominant contributor to global warming and climate change, originating from activities such as the burning of coal, oil, and gas for energy, incineration of trash or wood, and industrial processes like cement manufacturing (Nasih et al., 2019).

The issues related to climate change and global warming have spurred the development of new environmental policies. A significant policy is the Kyoto Protocol of 1997, aimed at reducing GHG emissions and maintaining atmospheric GHG concentrations at levels that do not harm the Earth's climate system (Pratiwi et al., 2021). Indonesia, as a signatory of the Kyoto Protocol, formally adopted it through Law No. 17 of 2004. The country's commitment to reducing carbon emissions is further evidenced by Presidential Regulation No. 71 of 2011 on national greenhouse gas inventories and Presidential Regulation No. 61 of 2011 on the Greenhouse Gas Reduction Action Plan (Apriliana et al., 2019). Additionally, in 2015, the Indonesian government joined 196 other countries in signing the Paris Agreement, underscoring its dedication to reducing greenhouse gas emissions and mitigating environmental damage (Muhammad & Aryani, 2021).

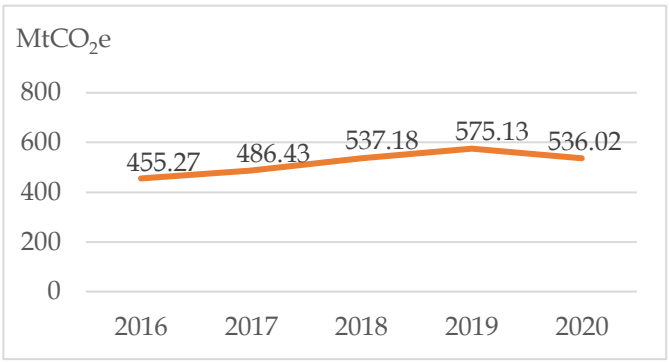

Figure 1. Energy Sector CO2 Emissions in Indonesia 2016-2020

Source: Climate watch

The energy sector in Indonesia is a significant source of carbon emissions, comprising companies involved in both the extraction of non-renewable energy, such as fossil fuels, and the provision of alternative energy products and services. Figure 1 illustrates the carbon emissions generated by Indonesia's energy sector from 2016 to 2020, which have generally increased. A primary contributor to this rise is the reliance on fossil fuel-based energy, which generates substantial carbon emissions (Nasih et al., 2019). However, in 2020, carbon emissions in the energy

sector decreased by 536.02 MtCO2 e, attributed to restrictions on industrial activities and community mobility due to the COVID-19 pandemic (IMF, 2022).

In Indonesia, carbon emission disclosure remains voluntary, resulting in limited participation among companies (Pramuditya & Budiasih, 2020). Firms have begun disclosing carbon emissions to meet stakeholder expectations, aiming to enhance transparency and accountability. Various studies have explored factors influencing carbon emission disclosure, yielding diverse findings. Dewi et al. (2019) and Majid et al. (2023) found a positive association between government ownership and carbon emission disclosure. Conversely, Kiswanto et al. (2023) reported no correlation between government ownership and carbon emission disclosure.

Research on the impact of leverage on carbon emission disclosure has also produced mixed results. Studies by Abdullah et al. (2020) and Desai (2022) suggest that leverage influences carbon emission disclosure. In contrast, Riantono & Sunarto (2022) and Yusuf (2021) found no such effect. Similarly, findings regarding the relationship between media exposure and carbon emission reporting are inconsistent. Deniswara et al. (2023) and Florencia & Handoko (2021) identified a positive influence of media exposure on carbon emission reporting, whereas Asmeri et al. (2023) and Putri & Arieftiara (2023) found no impact.

Additionally, research on the correlation between environmental performance and carbon emission disclosure has yielded varied outcomes. Deniswara et al. (2023) and Jannah & Narsa (2021) observed a positive effect of environmental performance on carbon emission disclosure. In contrast, Ratmono et al. (2021) concluded that environmental performance does not affect carbon emission disclosure.

This study aims to empirically investigate the effect of government ownership, leverage, media exposure, and environmental performance on the disclosure of carbon emissions by energy sector firms listed on the IDX for the period 2018-2022. Energy sector companies were selected due to their high potential for generating substantial greenhouse gas emissions and their significant reliance on energy, particularly fossil fuels such as coal and petroleum, for operational activities (Nasih et al., 2019).

According to legitimacy theory, a company must meet stakeholder expectations and secure their support to ensure sustainability (Akbaş & Canikli, 2019). Companies disclose more environmental information to respond to government pressure and align their actions with stakeholder expectations. Governments with majority shareholdings can direct companies to comply with regulations and maintain legitimacy and reputation in the public eye. State-owned companies are often expected to set standards for carbon emission disclosure and energy usage (Dewi et al., 2019). Studies by Majid et al. (2023) and Hermawan et al. (2018) indicate that government ownership positively influences carbon emission disclosure. The greater the government's shareholding in a firm, the more extensive its carbon emission disclosure.

H_1: Government ownership has a positive effect on carbon emission disclosure.

Leverage assesses the extent of a firm's reliance on debt to finance its operations (Astiti & Wirama, 2020). Companies with high leverage show a dependence on debt, increasing the risk of default (Florencia & Handoko, 2021).

According to stakeholder theory, highly leveraged businesses are held more accountable to creditors, incentivizing them to prioritize debt repayment over carbon emission reporting (Mujiani et al., 2019). Voluntary carbon emission disclosure imposes additional costs, which can hinder a company's ability to meet its obligations to creditors. Firms with low leverage have greater capacity to disclose emissions as they have fewer financial obligations, allowing for more comprehensive reporting (Ratmono et al., 2021). Higher leverage levels tend to result in fewer disclosures as companies focus on fulfilling financial obligations rather than making disclosures.

H_2: Leverage has a negative effect on carbon emission disclosure.

Legitimacy theory suggests that companies will enhance their disclosure efforts, including carbon emissions, to gain legitimacy from society (Florencia & Handoko, 2021). Media exposure can be leveraged by companies to influence public perception regarding their environmental commitment. The media serves as a vital channel for disseminating information to the public, including environmental information provided by companies (Krisnawanto & Solikhah, 2019). With rapid technological advancements and the progression of the digital era, stakeholders require timely information, and online media offers one of the quickest means to access this information (Lei et al., 2019). Media exposure compels companies to publicize their environmental initiatives, prompting public pressure for more detailed disclosures, particularly concerning carbon emissions. Consequently, firms with greater media exposure tend to be more active in reporting their carbon emissions.

H_3: Media exposure has a positive effect on carbon emission disclosure.

Environmental performance pertains to an organization’s efforts to manage its environmental impact (Dewayani & Ratnadi, 2021). It reflects a company's commitment to mitigating the environmental effects of its operations. According to legitimacy theory, companies must consistently demonstrate that their operations align with societal values and norms (Kusumaputri & Mimba, 2021). Companies that prioritize environmental preservation gain public legitimacy. Superior environmental performance encourages companies to disclose their carbon emissions, thereby enhancing their public image (Kiswanto et al., 2023). Firms with higher environmental performance are more likely to provide extensive carbon emission disclosures.

H_4: Environmental performance has a positive effect on carbon emission disclosure.

RESEARCH METHODS

The study's population comprises all firms in the energy industry listed on the Indonesia Stock Exchange (IDX) during the period from 2018 to 2022. Purposive sampling was employed, resulting in a sample of eight companies selected based on specific criteria. The study utilized quantitative data, including PROPER ratings and annual reports from the companies. Secondary data was obtained from the Ministry of Environment and Forestry's website, the official IDX website, and the respective companies' websites.

In this study, the dependent variable, carbon emission disclosure (CED), is measured using the CDP disclosure index developed by Choi et al. (2013). If a

company discloses a specified item, it is assigned a score of 1; if not, it receives a score of 0. There are 18 disclosure items in the index. The company's total score is calculated by summing the disclosed items and then dividing by the total number of disclosure items (18).

The independent variables in this study are government ownership, leverage, media exposure, and environmental performance. Government ownership (GO) is represented by a dummy variable. A value of 1 is assigned if the company is a state-owned enterprise (SOE), and a value of 0 if it is not (Dewi et al., 2019).

Leverage (DAR) indicates the extent of a company's reliance on debt to finance its operations (Astiti & Wirama, 2020). It is measured using the debt-to-asset ratio (DAR), which is calculated by dividing a firm's total debt by its total assets (Hapsari & Prasetyo, 2020).

Media exposure reflects the extent to which companies interact with stakeholders and provide information about their prospects, sustainability reports, and annual reports through their websites. A dummy variable is used to measure media exposure. Companies that fully disclose information about their carbon emissions on their websites or through other media, such as annual reports and sustainability reports, are assigned a value of 1; otherwise, they are assigned a value of 0 (Abdullah et al., 2020).

Environmental performance refers to a company's environmental management system aimed at preserving and conserving the environment and taking responsibility for environmental damage caused (Dewayani & Ratnadi, 2021). In this study, environmental performance is assessed by the PROPER rating, which is categorized into five colors, with each color assigned a score (Pratiwi et al., 2021).

The study employs multiple linear regression analysis as the data analysis technique. Before testing the hypotheses using the regression model, classical assumption tests are conducted. The specific multiple linear regression model used in this study is outlined below.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \quad (1)$$

Where:

Y	= Carbon Emission Disclosure
α	= Constant
$\beta_1, \beta_2, \beta_3, \beta_4$	= Regression Coefficient
X_1	= Government Ownership
X_2	= Leverage
X_3	= Media Exposure
X_4	= Environmental Performance

RESULTS AND DISCUSSION

In this study, eight companies were selected based on specific criteria, resulting in a total of 40 observations. The descriptive analysis provides an overview of the research variables, detailing the mean, standard deviations, and the range from the minimum to the maximum values.

Table 1. Descriptive Statistics Results

Model	N	Minimum	Maximum	Mean	Std. Deviation
GO	40	0.00	1.00	0.25	0.44
DAR	40	0.26	0.96	0.54	0.20
ME	40	0.00	1.00	0.93	0.27
PROPER	40	3.00	5.00	4.05	0.85
CED	40	0.06	0.78	0.52	0.18

Source: Research Data, 2024

Table 1 shows that the number of observations (N) is forty. Government ownership (GO) has a mean of 0.25 and a standard deviation of 0.44, with values ranging from 0.00 to 1.00. The fact that the mean is smaller than the standard deviation (0.25 < 0.44) indicates a less precise distribution of government ownership values, as the high standard deviation suggests significant variability. The leverage variable (DAR) has a mean of 0.54 and a standard deviation of 0.20, with values ranging from 0.26 to 0.96. The lower standard deviation relative to the mean (0.20 < 0.54) indicates a more favorable and consistent distribution of leverage values. For the media exposure variable (ME), the mean is 0.93, and the standard deviation is 0.27, with values spanning from 0.00 to 1.00. The higher mean compared to the standard deviation (0.93 > 0.27) suggests a well-distributed set of media exposure values. The environmental performance variable (PROPER) has a mean of 4.05 and a standard deviation of 0.85, with values ranging from 3.00 to 5.00. The higher mean relative to the standard deviation (4.05 > 0.85) implies an evenly distributed set of environmental performance values. Lastly, the carbon emissions disclosure (CED) variable has a mean of 0.52, a standard deviation of 0.18, and values ranging from 0.06 to 0.78. The fact that the standard deviation is lower than the mean (0.18 < 0.52) indicates a favorable distribution of carbon emissions disclosure values.

Table 2. Normality Test Results

		Unstandardized Residual
N		40
Normal Parameters[a,b]	Mean	0.000
	Std. Deviation	0.123
Most Extreme Differences	Absolute	0.101
	Positive	0.073
	Negative	-0.101
Test Statistic		0.101
Asymp. Sig. (2-tailed)		0.200

Source: Research Data, 2024

In this study, a one-sample Kolmogorov-Smirnov test was conducted to assess the normality of the data. Table 2 shows that the Asymptotic Significance (2-tailed) value is 0.200, which exceeds the threshold of 0.05 (0.200 > 0.05). This indicates that the data for the regression model follow a normal distribution.

Table 3. Heteroscedasticity Test Results

Model	Sig.
GO	0.984
DAR	0.601
ME	0.166
PROPER	0.462

Source: Research Data, 2024

The results of the Glejser test for heteroscedasticity, as presented in Table 3, indicate that the significance levels for the government ownership (GO), leverage (DAR), media exposure (ME), and environmental performance (PROPER) variables all exceed 0.05. This suggests that there is no heteroscedasticity present in the regression model used in the study.

Table 4. Multicollinearity Test Results

Model	Collinearity Statistics	
	Tolerance	VIF
GO	0.792	1.263
DAR	0.920	1.087
ME	0.931	1.075
PROPER	0.821	1.218

Source: Research Data, 2024

Table 4 shows that all Tolerance values exceed 0.01 and all VIF values are below 10. This indicates that there is no significant correlation among the independent variables, including government ownership, leverage, media exposure, and environmental performance, thereby alleviating concerns about multicollinearity.

Table 5. Autocorrelation Test Results

	Unstandardized Residual
Test Value[a]	-0.004
Cases < Test Value	20
Cases >= Test Value	20
Total Cases	40
Number of Runs	15
Z	-1.762
Asymp. Sig. (2-tailed)	0.078

Source: Research Data, 2024

The results of the Run Test for autocorrelation, presented in Table 5, show that the Asymptotic Significance (2-tailed) value is 0.078, which is higher than the 0.05 threshold (0.078 > 0.05). This indicates that the regression model does not suffer from autocorrelation issues.

Table 6. Multiple Linear Regression Analysis Results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.180	0.131		1.370	0.179
GO	-0.065	0.053	-0.160	-1.222	0.230
DAR	-0.173	0.106	-0.198	-1.629	0.112
ME	0.484	0.081	0.720	5.968	0.000
PROPER	0.002	0.027	0.008	0.065	0.949
F Statistik					9.712
Sig. F					0.000
R Square					0.526
Adjusted R Square					0.472

Source: Research Data, 2024

According to Table 6, this study's multiple linear regression model can be outlined as follows:

CED = 0.180 – 0.065 GO - 0.173 DAR + 0.484 ME + 0.002 PROPER + e …..…..... (2)

The constant value of 0.180 represents the carbon emission disclosure (CED) variable's value when government ownership (GO), leverage (DAR), media exposure (ME), and environmental performance (PROPER) remain unchanged. The GO coefficient (-0.065) indicates that a 1-unit increase in the GO variable will decrease the CED value by 0.065 units, assuming all other independent variables remain constant. Similarly, the DAR coefficient (-0.173) suggests that a 1-unit increase in the DAR variable will reduce the CED value by 0.173 units, provided that all other independent variables are held constant. In contrast, the ME coefficient (0.484) implies that a 1-unit increase in the ME variable will increase the CED value by 0.484 units, assuming all other independent variables remain unchanged. Lastly, the PROPER coefficient (0.002) indicates that a 1-unit increase in the PROPER variable will result in a 0.002-unit increase in the CED value, provided that all other independent variables remain constant.

Table 6 shows an adjusted R-squared value of 0.472, meaning that approximately 47% of the variance in carbon emission disclosure (CED) can be explained by the independent variables of government ownership, leverage, media exposure, and environmental performance. The remaining 53% of the variance is attributable to factors not included in the model.

According to the results in Table 6, the significance F-value is 0.000, which is below the threshold of 0.05 (0.000 < 0.05). This indicates that the independent variables (government ownership, leverage, media exposure, and environmental performance) collectively have a significant impact on the dependent variable (carbon emission disclosure). Therefore, the model used in this study is considered appropriate.

The first hypothesis posits that government ownership positively affects the disclosure of carbon emissions. However, as indicated in Table 6, the government ownership variable (GO) has a negative t-value of 1.222 and a significance value of 0.230, which exceeds the threshold of 0.05 (0.230 > 0.05). These results suggest that government ownership does not influence the disclosure of carbon emissions, thus hypothesis H1 is not supported by this study's findings.

Companies may choose to disclose their carbon emissions voluntarily since the government, acting as a regulator, has not yet established mandatory disclosure laws (Kiswanto et al., 2023). The minimal effect of government ownership on carbon emission disclosure in this study could be attributed to the small number of observations from state-owned enterprises (SOEs), which may not be sufficient for making broad generalizations. According to stakeholder theory, companies need to meet stakeholders' expectations to secure long-term sustainability (Akbaş & Canikli, 2019). Both SOEs and private companies are more likely to view environmental reporting as a voluntary action rather than a mandatory obligation (Wibowo et al., 2022). By voluntarily disclosing environmental information, companies aim to meet the expectations and demands of stakeholders, including the government, thereby enhancing public trust and support. The conclusions of this research align with the studies by Andriadi & Werastuti, (2020), Setiany et al. (2022), and Kiswanto et al. (2023), but contradict the findings of Dewi et al. (2019), Hermawan et al. (2018), and Majid et al. (2023).

The second hypothesis suggests that leverage negatively affects the disclosure of carbon emissions. However, as shown in Table 6, the leverage variable has a negative t-value of 1.629 and a significance value of 0.112, which is higher than 0.05 (0.112 > 0.05). The findings of this study imply that leverage does not influence the disclosure of carbon emissions, thus hypothesis H2 is not accepted.

Both firms with high and low leverage tend to proceed cautiously with voluntary disclosure due to potential increases in operational costs and financial burdens (Saptiwi, 2019). As a result, companies prefer to allocate their resources to improving productivity rather than investing in carbon emission disclosure. Theoretically, this study challenges stakeholder theory, which suggests that a company with higher leverage has a stronger commitment to its creditors and thus prioritizes debt repayment over social responsibilities like disclosing carbon emissions (Mujiani et al., 2019). High leverage levels compel companies to focus on enhancing their financial performance to maximize profitability rather than fulfilling social obligations such as carbon emission disclosure. The findings of this study align with those of Deniswara et al. (2023), Dewi et al. (2019), Riantono & Sunarto (2022), and Yusuf (2021), all of which suggest that leverage does not impact carbon emission disclosure. However, this contradicts the results of studies by Desai (2022), Digdowiseiso et al. (2022), and Hapsari & Prasetyo (2020).

The third hypothesis states that the disclosure of carbon emissions is positively impacted by media exposure. Table 6 indicates that the media exposure variable has a significant value of 0.000, which is below 0.05 (0.000 < 0.05), and a positive t-value of 5.968. This result supports hypothesis H3, indicating that media exposure positively impacts carbon emission disclosure.

Companies tend to share information more readily when closely monitored by the media, particularly concerning the reporting of carbon emissions (Kiswanto et al., 2023). Businesses that receive greater public attention for their actions generally perform better overall, particularly regarding environmental matters like reporting carbon emissions. According to legitimacy theory, to gain public favor, companies should disclose their carbon emissions more frequently (Florencia & Handoko, 2021). Increased media visibility might prompt companies

to seek public endorsement and legitimacy. The findings of this study align with those of Shao & He (2022), Deniswara et al. (2023), and Hapsari et al. (2021), but contrast with those of Asmeri et al. (2023) and Krisnawanto & Solikhah (2019), which argue that media exposure does not impact carbon emission disclosure.

The fourth hypothesis posits that the disclosure of carbon emissions is positively impacted by environmental performance. However, Table 6 shows that the environmental performance variable has a significance value of 0.949 and a positive t-value of 0.065. As a result, the study refutes hypothesis H4, indicating that environmental performance does not impact carbon emission disclosure.

Firms with higher PROPER ratings might believe that their score, which reflects their efforts to reduce carbon emissions, negates the need to disclose specific carbon emission data. Such information is typically found only in the sustainability or annual reports of these companies. Conversely, businesses with lower PROPER scores often disclose their carbon footprint to gain public acceptance (Dewayani & Ratnadi, 2021). Theoretically, these findings challenge legitimacy theory, which asserts that companies must consistently align their operational activities with prevailing social values and norms to gain legitimacy (Kusumaputri & Mimba, 2021). Instead of using the PROPER rating as a determinant for carbon emission disclosure, companies aim to enhance their legitimacy and public confidence by being transparent about their operational actions, particularly regarding carbon emissions (Dewi et al., 2019).

These research results are consistent with the conclusions of studies conducted by Kholmi et al. (2020), Pratiwi et al. (2021), and Ratmono et al. (2021). However, they contradict the findings of Loru (2023), Saptiwi, (2019), and Yusuf (2021).

CONCLUSION

Based on the findings from the analysis, the conclusion is that the disclosure of carbon emissions is positively impacted by media attention. The more exposure a corporation receives in the media, the more actively it engages in disclosing carbon emissions. However, the disclosure of carbon emissions is not influenced by government ownership, leverage, or environmental performance.

In light of the research findings, several suggestions can be made. For companies, this research should serve as a reference in formulating regulations related to carbon emissions reporting and in making strategic decisions regarding government ownership, leverage, media exposure, and environmental performance. For investors, this study should be considered when making investment decisions, as it provides insight into the risks and opportunities linked to climate change and carbon emissions disclosure, which can help maximize returns. Future research could explore alternative measures for environmental performance to offer a broader understanding of its connection with carbon emission disclosure.

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