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THE INFLUENCE OF MEDIA PUBLICATIONS, ENVIRONMENTAL PERFORMANCE, LEVERAGE AND INDUSTRY TYPE ON CARBON EMISSION DISCLOSURE

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Abstract
Carbon emissions are the release of carbon gas into the atmosphere, which can arise as a result of a company's operational activities. Disclosure of carbon emissions is a form of responsible practice for environmental aspects carried out by companies. However, there are still companies that do not disclose carbon emission disclosure items. This research aims to examine the influence of Media Publications, Environmental Performance, Leverage and industry type on Carbon Emission Disclosure in energy sector companies listed on the Indonesia Stock Exchange. This research uses an associative quantitative approach. The type of data used is secondary data obtained from www.idx.co.id and the company website. The population in this research is Energy Sector Companies Registered on the IDX for the 2019 - 2023 Period. Meanwhile, the sample for this research was determined using a purposive sampling method so that 20 sample companies were obtained. The analytical method used is Panel Data Model Regression analysis. Data analysis used EViews version 12. The results of this research show that Media Publications, Environmental Performance and Leverage influence Carbon Emission Disclosure, while Industry Type has no influence on Carbon Emission Disclosure. It is hoped that this research can be used as additional information in making investment decisions, especially on environmental performance variables that influence the disclosure of carbon emissions. The limitations of this research are shown by the Adj R-Squred size of 18%. Therefore, it is recommended that future researchers re-examine other factors that have the potential to be determinants of carbon emissions disclosure besides the research variables.

Keywords: Media Publications, Environmental Performance, Leverage, Industry Type, Carbon Emission Disclosure

1. Introduction

The issue of climate change is an interesting phenomenon to be studied in the field of sustainability accounting related to the environment, because the world community is starting to care about the surrounding environment, various ways are done to repair damaged nature. Climate change as a global phenomenon is one of the biggest environmental issues in recent years (Akhiroh & Kiswanto, 2016). Global warming is the main cause of changes in climate, temperature and weather in the world.

Global warming can be interpreted as an increase in world temperature due to the Greenhouse Gas effect, and an increase in gas emissions such as nitrogen oxides (N2O), methane (CH4), sulfurhexafluoride (SF6), hydrofluorocarbons (HCFCs), perfluorocarbons (PFCs), and carbon dioxide (CO2), which accumulates in the atmosphere in large quantities (Guntari & Yunita, 2015). The phenomenon of global

warming (global warming) as a result of an increase in the average temperature of the earth's surface on a global scale is beginning to be felt by humankind.

Carbon dioxide (CO2) is the main contributor to greenhouse gases, because the content of this gas is most abundant in the atmosphere. The National Oceanic and Atmospheric Administration (NOAA) revealed that the level of carbon dioxide in the earth's atmosphere in May 2022 was recorded to reach a record high, which is 50 percent more than in the pre-industrial era with a figure of around 420 parts per million (ppm). In the era before the Industrial Revolution, CO2 (carbon dioxide) levels remained stable at around 280 ppm (parts per million). The increase in the amount of carbon dioxide (CO2) shows that pollution from the concentration of the gas in the atmosphere has crossed the threshold.

There are several impacts and disasters caused by climate change that cannot be returned to their original conditions, such as sea level rise due to melting polar ice, prolonged droughts, and even species extinction (Zandalinas et al., 2021). One of the causes of climate change in the world that in the process can have consequences for the environment, human health, and even economic instability is carbon emissions (Syayuti, 2023).

Carbon emissions occur as a result of human activities as industry players whose production processes have produced exhaust gases in the air when trying to increase company profits (MIT News, 2023). Carbon emissions originating from global industries are one of the issues of public concern, where these emissions are generated from industrial activities such as manufacturing companies (Wirawan & Setijaningsih, 2022). The industrial sector is driven by energy sourced from fossil fuels such as coal, petroleum, and gas, resulting in carbon dioxide (CO2) which is one of the most contributing elements of greenhouse gases on earth (Pratama, 2019).

Efforts to reduce greenhouse gas emissions by companies as business actors can be found out from Carbon Emission Disclosure (Apriliana, Ermaya, & Septyan, 2019). According to Cahya (2016), Carbon Emission Disclosure is a disclosure to assess carbon according to the organization and set targets to be achieved in reducing carbon emissions. These disclosures are usually reported in annual reports and/or sustainability reports. However, the disclosure of carbon emissions is still voluntary (voluntary disclosure) so there are still many companies that have not disclosed it in accordance with existing regulations.

There are several factors that affect Carbon Emission Disclosure, namely: industry type, environmental performance, profitability, media exposure, leverage, company visibility, corporate governance characteristics, and company size. In this study, the researcher chose 4 variables, namely: Media Publication, Environmental Performance, Leverage, and Industry Type.

Media publications have a very vital role for the company's reputation and value because the media always supervises the company's activities and provides information to the wider community. Companies that are often in the media will be more motivated to disclose environmental activities if the media is active in supervising the environmental activities of a country (Nur & Priantinah, 2012). Media coverage can affect public attitudes towards the company, which can further affect stakeholders. The dynamics between stakeholders and media coverage have an important impact on voluntary environmental disclosure (Dawkins & Fraas, 2011).

A company must have good environmental performance. This can be a consideration for companies in disclosing carbon emissions. Companies with good environmental

performance will tend to make wider carbon emission disclosures compared to companies with poor environmental performance. The higher the environmental performance owned by the Company, the higher the level of carbon emission disclosure carried out. With good environmental performance, the public will have much more confidence in the company's responsibility to the surrounding environment. Environmental performance can be seen from the PROPER rating (Corporate Performance Rating Assessment Program) given by the Ministry of Environment and Forestry.

Research conducted by Apriliana et al (2019) stated that there was no significant influence between environmental performance and carbon emission disclosure. According to Gladia and Surya (2013) stated that companies that have good environmental performance will voluntarily disclose environmental information in an effort to distinguish themselves from other companies that have poor environmental performance.

The level of leverage affects the liability to creditors. The higher the company's leverage, the higher its responsibility to creditors. Companies with high leverage will tend to choose to pay off their debts rather than making voluntary disclosures because it will only add to the burden on the company (Luo et al., 2013 in Suhardi and Purwanto, 2015). Ghomi and Leung (2013) found that leverage has a positive relationship with GHG (Green House Gas) disclosure.

Companies with high debt tend not to disclose their carbon emissions because they cannot afford to pay the cost of production and publication of information on environmental practices (Andrikopoulos and Kriklani in Eleftheriadis and Anagnostopoulou, 2015).

Industry Type is a grouping of industries divided into two categories. Referring to the Global Industry Classification Standard (GICS), the two categories are non-intensive industries and industries that are intensive in producing carbon emissions. This factor is adopted on the assumption that companies that are carbon intensive will receive greater pressure from the public so that intensive companies have a greater opportunity to disclose carbon emissions compared to non-intensive companies (Salbiah & Mukhibad, 2018).

2. Theoretical Background

2.1 Theory of Legitimacy

Dowling and Pfeffer (1975) explained that the theory of legitimacy is very useful in analyzing organizational behavior. Legitimacy is important to organizations, the boundaries emphasized by social norms and values, and the reaction to those limits drives the importance of analyzing organizational behavior with respect to the environment. Organizations seek to create harmony between the social values inherent in their activities and the norms of behavior that exist in the social system of society of which the organization is a part. As long as the two value systems are aligned, we can see it as corporate legitimacy. When actual or potential misalignment occurs between the two value systems, there will be a threat to the legitimacy of the company.

2.2 Stakeholder Theory

Gray and Lavers (1994) said that the survival of a company depends on stakeholder support and that support must be sought so that the company's activity is to seek such support. The more powerful the stakeholder, the greater the company's efforts to adapt,

and social disclosure is considered part of the dialogue between the company and its stakeholders.

Clarkson (1995) explained that a stakeholder is a person or group that owns, approves, ownership of rights or interests in a company and its activities are carried out in the past, present and future. Stakeholders consist of shareholders, creditors, consumers, suppliers, the government, the community, analysts and other parties.

2.3 Agency Theory

The concept of agency theory according to Scott (1997) in Karuniasari (2013) is a relationship or contract between the principal (owner) and the agent (management). Principals can be defined as shareholders or other traditional users. As an agent, the management will try to operate the company in accordance with the wishes of the public. Agents are required to provide periodic reports to the principal about the business being run. So, stakeholders or investors do not have direct control over the decisions made by managers.

2.4 Carbon Emission Disclosure

Carbon emission disclosure is a voluntary disclosure made by a company as outlined in an annual report on the company's activities related to carbon emissions. Carbon emission disclosure is one of the ways that companies take to legitimize their activities. This disclosure is still a voluntary disclosure, so not all companies disclose carbon emissions. Based on sustainable development goals that consistently encourage economic, social, and environmental balance, the disclosure of carbon emissions is the company's commitment to account for the environmental impacts it causes in the social, economic, and environmental dimensions (Akhiroh, 2016).

Carbon emission disclosure can be measured using the Carbon Emission Disclosure Cheklist. Carbon Emission Disclosure is measured using the disclosure checklist index developed by Choi, et al (2013) which is divided into five major categories, namely: climate change, greenhouse gas emissions, energy consumption, greenhouse gas reduction and carbon emissions with a total of 18 items.

2.5 Media Publications

Nowadays, communication tools and the internet are developing rapidly, causing the media to have an important role in influencing people's attitudes towards companies (Jannah & Muid, 2014). A company's reputation and value can depend on how well the media covers and reports on the company's activities. Nur & Priantinah (2012) said that the more active the media is in monitoring a country's environment, the more motivated the company will be to disclose its activities.

Disclosure through the media makes people will understand the surrounding environmental conditions more quickly so that they can take a stance on the news they get (Linggasari, 2015). As Jannah & Muid (2014) says, the media can also be used as a controller of a company's activities. With news through the media, stakeholders become faster to understand the surrounding environment and take a stance on the news.

The presence of media in a country as a controller of company activities, so companies need to consider the existence of the media. If there is a negative issue regarding the company, then the public may criticize the company's activities and reduce the value of the company. This is in accordance with the research of Dawkins and Fraas (2011) that

the media affects what the public thinks about the number and type of various events given.

2.6 Environmental Performance

Environmental performance is the company's performance in creating a good (green) environment (Suratno, et al, 2006). The company pays great attention to the environment as a form of corporate responsibility and concern for the environment. Winarsih (2015) argues that the company's environmental performance is the company's performance in creating a good environment in accordance with the goals of stakeholders. Environmental performance focuses on the company's activities in preserving the environment and reducing environmental impacts such as waste from company activities. The assessment of environmental performance is based on three aspects, including environmental policies, environmental goals and environmental targets. Environmental performance is one of the investments for companies to achieve success in their business.

Environmental performance can be measured by using the job rating assessment program or commonly called PROPER, which is the flagship program of the Ministry of Environment which is packaged in the form of supervision activities and the provision of incentives or disincentives to the person in charge of the business or activity. The PROPER program began in 1996. The basis for holding PROPER is Law No. 32 of 2009 concerning environmental protection and management and Regulation of the Minister of State for the Environment No. 2011 concerning PROPER (Aulia, 2015). The company's work rating assessment program can be measured by a color rating divided into 5 color ratings, aiming to facilitate communication with stakeholders in responding to the results of the company's environmental performance. The five color levels used are gold, green, blue, red and black.

A company will get a gold rating if the company has consistently demonstrated environmental excellence in the production process or services, carried out ethical and socially responsible business, green rating if the company has carried out environmental management more than required in the regulations through the implementation of an environmental management system, efficient use of resources through 4R (reduce, reuse, recycle, and recovery) and do social responsibility well. Blue rating if the company has carried out the required environmental management efforts as stipulated in the law, red rating if the company does not carry out environmental management as regulated in the law and the company will get a black rating if the company deliberately commits acts or omissions that result in pollution or environmental damage or violation of laws and regulations or does not carry out sanctions administration.

2.7 Leverage

Leverage is a comparison of the amount of funds provided by the owner with funds borrowed from creditors. This ratio shows the ability of its own capital to meet all obligations of the company (Istanti, 2009). According to Choi, et al (2013) said that leverage is the ratio between total debt to total assets of a company. Leverage indicates the percentage of funds used by creditors to finance the company's assets, so the company's decision is highly dependent on the leverage conditions experienced.

Companies with high leverage tend to concentrate more on paying off obligations as opposed to making voluntary disclosures. This is because voluntary disclosure requires considerable costs and there is pressure from creditors to the company to ensure that the money borrowed by the company can be returned within the specified time limit, so that

the company is more likely to allocate its limited resources to pay off all obligations than to make a voluntary report. So the higher the company's leverage, the less voluntary disclosure is made.

2.8 Industry Type

(Agus Purwanto, 2007; Probosari & Kawedar, 2019) stated that the type of industry is the benchmark of a company whether the company is large or small. If the company is large, it is possible that it will provide more complete information and can reduce the impact on the community. Industrial types or types can be divided into carbon-intensive and non-carbon-intensive. Companies with more intensive environmental impacts will be required to disclose more information about the environment than companies with non-intensive environmental impacts.

(P. C. Pratiwi & Sari, 2016) revealed that companies with high carbon intensity tend to disclose voluntary disclosures, one of which is disclosing carbon emissions to meet the requirements of society so that companies obtain legitimacy that comes from public trust. Industrial types or types can be divided into carbon-intensive and non-carbon-intensive. Companies with more intensive environmental impacts will be required to disclose more information about the environment than companies with non-intensive environmental impacts.

3. Methods

3.1 Population and Research Sample

This study uses a type of secondary data with the population of companies listed on the Indonesia Stock Exchange in the period 2019-2023. The data source uses the company's annual report contained on the IDX or IDX (www.idx.co.id) website and the website of each company. Sampling in the study was carried out using the purposive sampling method. The following are some of the criteria for companies that are used as sampling:

1) Companies listed on the IDX for the period of 2019 – 2023.
2) Companies that provide complete Financial Statement and Annual Report data.
3) Companies listed in the PROPER rating recorded at the Ministry of Environment for the period 2019 - 2023.
4) Companies that disclose carbon emissions (at least one policy or regulation related to carbon/greenhouse gas emissions or disclose at least one carbon emission disclosure item).

Based on the above criteria, the number of company samples available for hypothesis testing is 100 companies.

3.2 Variable Measurement

In this study, Carbon Emission Disclosure is measured using several items that determine categories relevant to climate change and carbon emissions. Choi, Lee, and Psaros (2013) define five broad categories relevant to climate change and carbon emissions as follows: risks and opportunities of climate change (CC/Climate Change), greenhouse gas emissions (GHG/Greenhouse Gas), energy consumption (EC/Energy Consumption), greenhouse gas reduction and cost (RC/Reduction and Cost) and carbon emission accountability (AEC/Carbon Emission). In the five categories, 18 items were identified.

The carbon emission disclosure checklist is shown in the following table:

Table 1. Carbon Emission Disclosure Checklist

Category	Items
Climate change: risks and opportunities (CC/Climate Change)	CC-1: Assessment/description of risks (both specific and general) related to climate change and the actions taken to manage those risks
	CC-2: Current (and future) assessment/description of the financial, business and opportunity implications of climate change.
Greenhouse Gas Emissions (GHG/Green House Gas)	GHG-1: A description of the methodology used to calculate greenhouse gas emissions (e.g., GHG or ISO protocols).
	GHG-2: The existence of external verification of the quantity of GHG emissions by whom and on what basis.
	GHG-3: Total greenhouse gas emissions (metric tons of CO2-e) produced.
	GHG-4: Scope 1 and 2 disclosures, or 3 of direct GHG emissions.
	GHG-5: Disclosure of GHG emissions based on their origin or source (e.g.: coal, electricity, etc.).
	GHG-6: GHG emission disclosure based on facility or segment level.
	GHG-7: Comparison of GHG emissions with previous years.
Energy Consumption (EC)	EC-1: The amount of energy consumed (e.g., tera-joules or peta-joules)
	EC-2: Quantification of energy used from renewable resources.
	EC-3: Disclosure by type, facility or segment.
Greenhouse Gas Reduction and Cost (RC)	RC-1: Details of a plan or strategy to reduce GHG emissions.
	RC-2: Specification of the target level/level and year of GHG emission reduction.
	RC-3: Reduction in emissions and costs or savings achieved today as a result of carbon emission reduction plans.
	RC-4: Future emission costs that are taken into account in capital expenditure planning.
Accountability of Carbon Emissions (AEC)	AEC-1: An indication in which a committee board (or other executive body) has responsibility for actions related to climate change.
	AEC-2: A description of the mechanism by which the board (or other executive body) reviews a company's progress regarding climate change.

Source: Choi et al (2013)

The calculation of the Carbon Emission Disclosure index according to Jannah and Muid (2014) is carried out with the following steps:

1) Scores each disclosure item on a dichotomous scale.

2) The maximum score is 18, while the minimum score is 0. Each item is worth 1 so if the company discloses all the items in the information in its report, then the company scores 18.
3) The score on each company is then summed up and divided by the maximum total score.
4) Then calculate the Carbon Emission Disclosure of each company with the following formula:

$$CED = \frac{\text{Number of items disclosed}}{18}$$

Media publications were measured using a checklist from the Carbon Disclosure Project developed by Choi et al (2013). However, this is different from the measurement of the dependent variable, carbon emission disclosure. When measuring carbon emission disclosure, using annual reports and/or sustainability reports, media disclosure uses existing media, such as websites, news and YouTube. Companies that frequently disclose information related to the disclosure of carbon gas emissions are rated 1 and vice versa, if the disclosure of carbon gas emissions is not much, it will be rated 0. Therefore, the company must be able to place a position in providing a good image.

The measurement of environmental performance in this study uses PROPER (Company Performance Rating Assessment Program in Environmental Management). The company's efforts to improve environmental performance can be signaled through the company's participation in the PROPER program (Ulfa & Ermaya, 2019).

PROPER serves to encourage companies to comply with laws and regulations through incentives and disincentives as well as encourage companies that already have good environmental performance to implement cleaner production. Referring to the research of Jannah and Muid (2014) this PROPER includes a rating of companies in 5 colors, namely: Gold (very very good, score 5), Green (very good, score 4), Blue (good, score 3), Red (bad, score 2), Black (very poor, score 1). The measurements in this study used a scale of 1 to 5 according to the type of color on PROPER.

In this study, the PROPER rating is shown in the following table:

Table 2. PROPER Rating

Scale	Color	Information
1	Black	Very bad
2	Red	Bad
3	Blue	Good
4	Green	Excellent
5	Gold	Very good

Source: Ministry of Environment, 2011

The leverage in this study is measured from the Debt to Equity Ratio (DER) because the DER reflects the large proportion between total debt and total shareholder's equity (total own capital). The formula used to calculate the debt to equity ratio according to Husnan and Pudjiastuti (2004) is as follows:

$$DER = \frac{\text{Total Liability}}{\text{Total Equity}}$$

In this study, the type of industry was measured using a dummy variable. A value of 1 is given to companies that are categorized as carbon-intensive industries operating in the transportation, utility, chemical, and pulp sectors. A value of 0 is given to companies that fall into the category of non-carbon-intensive industries that operate in sectors other than transportation, utilities, chemicals, and pulp.

To make the variables in this study easier to understand, here are the definitions and operational measurements of variables:

Table 3. Definition and Measurement of Variable Operations

It	Variable	Measurement	Scale
1	Variable Dependency: Carbon emission disclosure (Choi, Lee, and Psaros (2013)	Using content analysis , which is a comparison between the total items disclosed and the maximum items. CED = Number of items disclosed 18	Ratio
2	Variable independent: Media Publications (Jannah & Muid, 2014)	Measured by the dummy variable, a value of 1 is given to companies that share more information about carbon emissions on the company's website or in other media such as annual reports or sustainability reports. While the value of 0 is the opposite.	Nominal
3	Variable independent: Environmental Performance Or Rank of PROPER (Juniartha & Dewi, 2017)	Based on the PROPER color rating obtained by the company: 0 = not a participant 1 = very poor/ black 2 = bad/ red 3 = good/ blue 4 = very good/ green 5 = very good/ gold.	Nominal
3	Variable independent: Leverage (Mufidah, 2014)	Leverage: DER = Total Liability Total Equity	Ratio
4	Variable independent: Industry Type (Sari, 2012; Dewi & Aldhani, 2021)	For the dummy variable, a value of 1 is given if the company is included in the high profile criteria, and 0 if the company is included in the low profile criteria.	Nominal

Source: Various sources adjusted to the research variables (2024)

The data used in this study is secondary data. The data used in this study are secondary data obtained from financial statements and annual reports from companies that meet the sample criteria for the 2019-2023 period. The data was obtained from the official website of each company and the official website of the Indonesia Stock Exchange (IDX) which can be accessed on the www.idx.co.id domain. The population in the study is the area that the researcher wants to research. The population used in this study is energy sector companies listed on the Indonesia Stock Exchange for the 2019-2023 period. There are 87 energy sector companies listed on the Indonesia Stock Exchange in 2024 with the IDX-IC (Industrial Classification) classification.

4. Results and Discussion

4.1 Descriptive Statistical Analysis

According to Ghozali (2016:19), descriptive statistics are statistics that are used to analyze data by providing an overview or descriptive of a data seen from the average, maximum, minimum, and standard deviation values.

Table 4. Descriptive Statistical Results Table

	PEK	PM	KL	L	TI
Mean	0.775556	0.490000	3.710000	1.369400	0.200000
Median	0.777778	0.000000	3.500000	0.980000	0.000000
Maximum	1.000000	1.000000	5.000000	24.85000	1.000000
Minimum	0.222222	0.000000	3.000000	0.100000	0.000000
Std. Dev.	0.158895	0.502418	0.795124	2.603207	0.402015
Skewness	-0.951487	0.040008	0.563281	7.582871	1.500000
Kurtosis	4.392434	1.001601	1.814030	67.80555	3.250000
Jarque-Bera	23.16742	16.66668	11.14862	18457.33	37.76042
Probability	0.000009	0.000240	0.003794	0.000000	0.000000
Sum	77.55556	49.00000	371.0000	136.9400	20.00000
Sum Sq. Dev.	2.499506	24.99000	62.59000	670.8920	16.00000
Observations	100	100	100	100	100

Source: Data processed by the author with E-Views 12.0, 2024

The table shows the results of descriptive statistics with a sample of 20 companies during the period 2019 – 2023. The sampling technique using purposive sampling, the results of the descriptive analysis table above show that the number of data observed, namely 100 data obtained from 20 companies, multiplied by the observation period for 5 years, from 2019 to 2023. From the results of the descriptive analysis in the table above, the following results are shown:

1) The Carbon Emission Disclosure variables observed during the research period can be seen from the output results, that the Carbon Emission Disclosure value has the lowest value of 0.222222. The mean value is 0.775556 with a standard deviation value of 0.158895. The results of the descriptive analysis show a larger mean value compared to the standard deviation value. This means that if the mean value of a dataset is greater than the standard deviation, it indicates that the distribution of the data tends to be scattered towards the average value with relatively small variation compared to the average value.
2) The Media Publication variable observed during the research period can be seen from the output results, that the Media Publication value has the lowest value of 0.000000. The mean value is 0.490000 with a standard deviation value of 0.502418. The results of the descriptive analysis showed a smaller mean value compared to the standard deviation value. This means that if the mean value of a dataset is smaller than the standard deviation, this indicates that the distribution of the data tends to tend towards lower values, which indicates that the data tends to have low values overall and has a wide variation in values from around the mean.
3) The Environmental Performance variables observed during the research period can be seen from the output results, that the Environmental Performance value has the lowest value of 3.0000000, while the highest value is 5.000000. The mean value is 3.710000 with a standard deviation value of 0.795124. The results of the descriptive analysis show a larger mean value compared to the standard deviation value. This means that if the mean value of a dataset is greater than the standard deviation, it indicates that the distribution of the data tends to tend towards higher values, which

indicates that the data tends to have high values overall and has significant variation around the mean.

4) The Leverage variable observed during the research period can be seen from the output results, that the Leverage value has the lowest value of 0.100000, with a mean of 1.369400 and a standard deviation of 2.603207. The results of the descriptive analysis show a smaller mean value compared to the standard deviation value. This means that if the mean value of a dataset is smaller than the standard deviation value, indicating that the distribution of the data tends to tend towards a lower value, this indicates that the data tends to have low values overall and has significant variation around the mean.
5) The Industrial Type variable observed during the research period can be seen from the output results, that the Industrial Type value has the lowest value of 0.0000000 and the maximum value of 1.000000, with a mean of 0.200000 and a standard deviation of 0.402015. The results of the descriptive analysis show a smaller mean value compared to the standard deviation value. This means that if the mean value of a dataset is smaller than the standard deviation, indicating that the distribution of the data tends to be skewed towards lower values, this indicates that the data tends to have low values overall and have significant variation around the mean.

4.2 Normality Test

The normality test on the regression model is used to test whether the residual values are normally distributed or not. A good regression model is one that has normally distributed residual values. The significance value of the normally distributed residual is if the probability value in the Jarque Bera test is more than α = 0.05 (Ghozali, 2016:161).

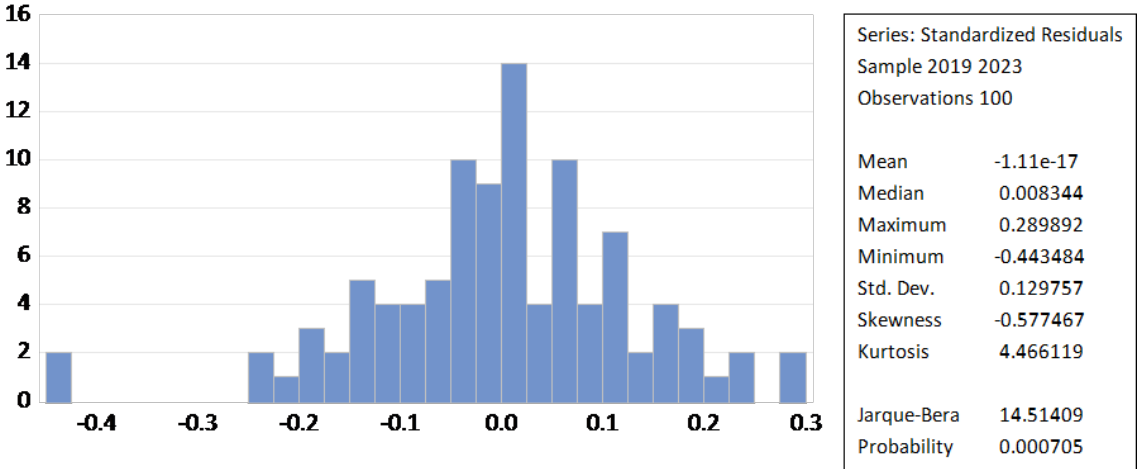

Figure 1. Normality Test Results

Source: Data processed by the author with E-Views 12.0, 2024

The results of the histogram graph above the Jarque-Bera value are 14.51409, while the probability value is 0.000705 which is less than the significance of 0.05, so it can be concluded that the data in this study is not distributed normally. If the normality test shows that what is used in this study tends to be abnormal, then the assumption of the Central Limit Theorem can be used, namely if the number of observations is large enough (n>30) then the assumption of normality can be ignored (Gujarati, 2003).

4.3 Multicollinearity Test

The multicollinearity test is a test used to find out whether there is a correlation between independent variables. The way to detect multicollinearity is to see if two independent variables have a correlation matrix value > 0.8, then there is multicollinearity, while a correlation value < 0.8 then there is no multicollinearity.

Table 5. Multicollinearity Test Results

	PM	KL	L	IT
PM	1.000000	0.131735	0.039869	0.110022
KL	0.131735	1.000000	0.085155	-0.290720
L	0.039869	0.085155	1.000000	-0.042770
IT	0.110022	-0.290720	-0.042770	1.000000

Source: Data processed by the author with E-Views 12.0, 2024

From the table above, the calculation results show that all independent variables have a < value of 0.80. Thus, it can be concluded that all independent variables do not occur multicollinearity.

4.4 Heteroscedasticity Test

The heteroscedasticity test aims to test whether in the regression model there is an unevenness of variance from the residual of one observation to another. In this study to find out whether or not heteroscedasticity exists, researchers use the Breush-Pagan-Godfrey test. This test can be seen from the probability of F-statistic greater than 0.05, so it can be said that there is no heteroscedasticity. Here are the results of the white test:

Table 6. Heteroscedasticity Test Results

F-statistic	3.594263	Prob. F(4,95)	0.0090
Obs*R-squared	13.14449	Prob. Chi-Square(4)	0.0106
Scaled explained SS	15.18606	Prob. Chi-Square(4)	0.0043

Source: Data processed by the author with E-Views 12.0, 2024

The test results in table 4.12 above can be seen that there is a problem of Heteroscedasticity. This is because the results were obtained in the form of a probability value of F-statistics of 0.0090 where the probability value of F-statistics was smaller than the significance level of 0.05 (0.0090 < 0.05 so that it can be concluded that the residual has a heterogeneous variety and the assumption of heteroscedasticity is not met, which means that the data used is not free from the symptoms of heteroscedasticity.

4.5 Autocorrelation Test

The autocorrelation test aims to test whether in a linear regression model there is a relationship between errors in the current year period and the previous year (Ghozali, 2016: 131). The provision in this test is that if the Durbin-Watson (DW) value is located between the boundary or upper bound (du) and (4-du), then the autocorrelation coefficient is equal to 0 means that there is no autocorrelation.

Table 7. Autocorrelation Test Results

R-squared	0.230328	Mean dependent var	9.71E-17
Adjusted R-squared	0.180671	S.D. dependent var	0.129755
S.E. of regression	0.117450	Akaike info criterion	-1.378174
Sum squared resid	1.282895	Schwarz criterion	-1.195812
Log likelihood	75.90871	Hannan-Quinn criter.	-1.304369
F-statistic	4.638439	Durbin-Watson stat	1.964097
Prob(F-statistic)	0.000363		

Source: Data processed by the author with E-Views 12.0, 2024

Autocorrelation testing was carried out using the Durbin Watson (DW) method and the criteria for no autocorrelation were if dL < dU < DW < (4-dU). Judging from the significance of 5% of the independent variable (k) = 4 and the number of samples (n) = 100, it is obtained that the value of dL = 1.5922, the value of dU = 1.7582, and the value of 4 – dU = 2.4078. From the output presented in table 4.14 that the value of DW (Durbin-Watson) is 1.964097, then the value criteria do not experience autocorrelation, namely 1.5922 < 1.7582 < 1.964097 < 2.2259, so that the result obtained is that there is no autocorrelation.

4.6 Panel Data Regression Analysis

Table 8. Results of Panel Data Regression Analysis Test (Common Effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.437935	0.068591	6.384693	0.0000
PM	0.096140	0.027078	3.550538	0.0006
KL	0.080532	0.017807	4.522447	0.0000
L	-0.015709	0.005136	-3.058517	0.0029
TI	0.066259	0.035051	1.890358	0.0618

Source: Data processed by the author with E-Views 12.0, 2024

The results of the table above after regression using the Common Effect model, the regression equation in this study is obtained as follows:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + e$$

$$PEK = 0.437935 + 0.096140\ PM + 0.080532\ KL - 0.015709\ L + 0.066259\ TI + e$$

Based on the equation, it can be interpreted as follows:

1) The constant number is 0.437935, meaning that if the independent variables have a constant value or a fixed value, the level of carbon emission disclosure is 0.437935.
2) The regression coefficient of the Media Publication variable is 0.096140, this figure can be explained if the other independent variables are fixed, so that the increase of one unit of Media Publication is accompanied by a decrease in carbon emission disclosure of 0.096140.
3) The regression coefficient of the Environmental Performance variable is 0.080532. This figure can be explained if the other independent variables are fixed, so that an increase in one unit of Environmental Performance is accompanied by a decrease in carbon emission disclosure of 0.080532.

4) The regression coefficient of the Leverage variable is - 0.015709. This figure can be explained if the other independent variables are fixed, so that an increase in one unit of leverage is accompanied by an increase in carbon emission disclosure of - 0.015709.
5) The regression coefficient of the Industrial Type variable is 0.066259. This figure can be explained if the other independent variables are fixed, so that the increase of one unit from the Industrial Type is accompanied by a decrease in carbon emission disclosure by 0.066259.

4.7 Hypothesis Test
4.7.1 Simultaneous Significance Test (Statistical Test F)
Table 9. Simultaneous F Test Results

R-squared	0.230328
Adjusted R-squared	0.180671
S.E. of regression	0.117450
Sum squared resid	1.282895
Log likelihood	75.90871
F-statistic	4.638439
Prob(F-statistic)	0.000363

Source: Data processed by the author with E-Views 12.0, 2024

In the table, it can be noted that the results of the f-test, have a prob value (F-statistic) of 0.000363 < 0.05, so it is concluded that the independent variables, namely Media Publications, Environmental Carriers, Leverage , and Industry Type have a simultaneous effect on the dependent variable, namely Carbon Emission Disclosure.

4.7.2 Individual Parameter Significance Test (t-Statistical Test)
Table 10. t Test Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.437935	0.068591	6.384693	0.0000
PM	0.096140	0.027078	3.550538	0.0006
KL	0.080532	0.017807	4.522447	0.0000
L	-0.015709	0.005136	-3.058517	0.0029
TI	0.066259	0.035051	1.890358	0.0618

Source: Data processed by the author with E-Views 12.0, 2024

Based on the table above, it can be seen that:

1) The Media Publication variable has an effect on Carbon Emission Disclosure, this can be seen from the value in the PM table of 0.0006 which is much smaller than the value of α 0.05. So, Hypothesis 1 answers that Media Publications have an effect on Carbon Emission Disclosure.
2) Environmental Performance variables affect Carbon Emission Disclosure, this can be seen from the value in the KL table of 0.0000 which is much smaller than the value of α 0.05. So, Hypothesis 2 answers that Environmental Performance affects Carbon Emission Disclosure.

3) The Leverage variable affects Carbon Emission Disclosure, this can be seen from the value in table L of 0.0029 which is much smaller than the value of α 0.05. So, Hypothesis 3 answers that Leverage has an effect on Carbon Emission Disclosure.
4) The Industrial Type variable has no effect on Carbon Emission Disclosure, this can be seen from the value in the IT table of 0.0618 which is greater than the value of α 0.05. So, Hypothesis 4 answers that the Industrial Type has no effect on Carbon Emission Disclosure.

4.7.3 Determination Coefficient Test (R2)

The determination coefficient is used to measure the extent to which the percentage of the ability of an independent variable affects the dependent variable simultaneously. The following table 4.18 shows the results of adjusted R-squared.

Table 11. Determination Coefficient Test Results

R-squared	0.230328	Mean dependent var	9.71E-17
Adjusted R-squared	0.180671	S.D. dependent var	0.129755
S.E. of regression	0.117450	Akaike info criterion	-1.378174
Sum squared resid	1.282895	Schwarz criterion	-1.195812
Log likelihood	75.90871	Hannan-Quinn criter.	-1.304369
F-statistic	4.638439	Durbin-Watson stat	1.964097
Prob(F-statistic)	0.000363		

Source: Data processed by the author with E-Views 12.0, 2024

The output results in table 4.17 above show that the Adjusted R Squared value is 0.180671 which means that 18.06% of the amount of Carbon Emission Disclosure (CED) can be explained by the variables of Media Publication, Environmental Performance, Leverage, and Type of Industry studied, while the remaining 81.94% is explained by other variables outside the study.

Partial regression testing or hypothesis testing obtained the following results:

1) Hypothesis 1 testing aims to test whether there is an influence of media publications on carbon emission disclosure. Based on the output shown in the table above, it is explained that the variable of media publication affects carbon emission disclosure. This can be seen from the t-count value for media publications of 0.0006 and the significance value of 0.05. Since the significance value is greater than the probability, or in other words 0.0006 < 0.05, the first hypothesis is accepted.
2) Hypothesis 2 testing aims to test whether there is an influence of environmental performance on carbon emission disclosure. Based on the output shown in the table above, it is explained that environmental performance variables affect carbon emission disclosure. This can be seen from the calculated t-value for environmental performance of 0.0000 and the significance value of 0.05. Since the significance value is greater than the probability, or in other words 0.0000 < 0.05, then the second hypothesis is accepted.
3) Hypothesis 3 testing aims to test whether there is an influence of environmental performance on carbon emission disclosure. Based on the output shown in the table above, it is explained that the leverage variable has an effect on carbon emission disclosure. This can be seen from the calculated t value for leverage of 0.0029 and the significance value of 0.05. Since the significance value is greater than the probability, or in other words 0.0029 < 0.05, the third hypothesis is rejected.

4) Hypothesis 4 testing aims to test whether there is an influence of industry type on carbon emission disclosure. Based on the output shown in the table above, it is explained that the industry-type variable has no effect on carbon emission disclosure. This can be seen from the calculated t-value for the industrial type of 0.0618 and the significance value of 0.05. Since the significance value is less than the probability, or in other words 0.0618 > 0.05, the fourth hypothesis is rejected.

5. Conclusion

Based on the research that has been carried out, it can be concluded that:

1) The results of the t-test showed that the Media Publication variable had a significant effect on Carbon Emission Disclosure.
2) The results of the t-test show that the Environmental Performance variable has an effect on Carbon Emission Disclosure.
3) The results of the t-test show that Leverage has a significant effect on Carbon Emission Disclosure.
4) The results of the t-test show that the Industrial Type has no significant effect on Carbon Emission Disclosure.
5) The research that has been carried out has several limitations, including the selection of samples is not carried out randomly but by purposive sampling, namely only in energy sector companies listed on the IDX during the 2019-2023 observation period, so that the findings in this study cannot be generalized, as well as limited access and availability of secondary data which is not always easily accessible or freely available. Some data is confidential or limited, only available through certain fees or permissions, or relevant data may not be available or difficult to find.
6) Based on the limitations of the study, there are suggestions for further research, namely conducting research on carbon emission disclosure in various sectors and countries, in order to gain a more holistic understanding of carbon emission issues and their impacts, as well as adopting a multidisciplinary approach in carbon emission disclosure research, by integrating economic, environmental, social, and ethical perspectives in order to obtain a more comprehensive understanding of emissions carbon

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