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Factors Affecting Disclosure of Carbon Emissions in Indonesian Companies

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Abstract

This paper aims to identify factors influencing management to disclose the carbon emissions from their operational activities. The carbon disclosure item is measured directly from individual companies' annual reports and sustainability reports. The sample is selected using a non-probability sampling technique with certain criteria. In this study, 126 samples are collected. This study applies multiple linear analyses and the t-test hypothesis for data analysis. The results showed that environmental performance negatively affects carbon emissions disclosure. At the same time, the type of company and profitability do not affect a company's decision to disclose its carbon emissions. This research differs from other research because it spans a long period from the early adaptation of carbon emissions. Therefore, we can observe how companies in Indonesia gradually disclose their carbon emissions. In general, it can be concluded that companies in Indonesia have started to disclose more items according to Carbon Emission Disclosure Index (CEDI).

Keywords: *Carbon Emissions; Climate Change; Disclosure; Environmental Performance; PROPER.*

Abstrak

Penelitian ini bertujuan untuk mengidentifikasi faktor-faktor yang mempengaruhi manajemen untuk mengungkapkan emisi karbon dari kegiatan operasionalnya. Jumlah pengungkapan karbon diukur langsung dari laporan tahunan dan laporan keberlanjutan masing-masing perusahaan. Sampel dipilih dengan menggunakan teknik non-probability sampling dengan kriteria tertentu. Pada penelitian ini diambil 126 sampel. Penelitian ini menggunakan analisis linier berganda dan hipotesis uji-t untuk analisis data. Hasil penelitian menunjukkan bahwa kinerja lingkungan berpengaruh negatif terhadap pengungkapan emisi karbon. Akan tetapi, jenis perusahaan dan profitabilitas tidak mempengaruhi keputusan perusahaan untuk mengungkapkan emisi karbonnya. Penelitian ini berbeda dengan penelitian lainnya karena rentang waktu yang panjang sejak awal adaptasi emisi karbon. Oleh karena itu, kita bisa mengamati bagaimana perusahaan-perusahaan di Indonesia secara bertahap mengungkapkan emisi karbonnya. Secara umum dapat disimpulkan bahwa perusahaan di Indonesia sudah mulai mengungkapkan lebih banyak item menurut Carbon Emission Disclosure Index (CEDI).

Kata kunci: Emisi Karbon; Kinerja Lingkungan; Perubahan Iklim; Pengungkapan; PROPER

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INTRODUCTION

The topic of climate change has become a worldwide concern (Erwin, 2020) . This climate change can occur due to global warming, which is characterized by an increase in the global average temperature of the earth's surface, one of which is caused by an increase in the greenhouse gas effect. According to the sixth report of the IPCC (Intergovernmental Panel on Climate Change) released in 2021, it is stated that there will be an increase in global temperatures reaching 1.5 degrees Celsius in the next two decades (Levin, Kelly, 2021).

The impacts of climate change pose great risks to humans and environment (Linnenluecke, Birt and Griffiths, 2015). One of many reason behind the climate change is due to human activities, such as the excessive use of natural resources which has raised many environmental concerns (Weng, Chen, & Chen, 2015). The industrial revolution was one of the most influential forces in shaping our current social and economic structures, as well as the pattern of human settlement, activity, and impact on the planet (Bebbington & Larrinaga-Gonzaléz, 2008). The scientific evidence points to the need for business, industry, and society to respond to the threats posed by climate change (Linnenluecke, Birt and Griffiths, 2015).

Unfortunately, firms have not taken tangible steps to limit activities that increase the effects of climate change (Linnenluecke, Birt and Griffiths, 2015). The lack of risk assessment, governance, and disclosure regulations in the Financial Statements makes the corporation unresponsive to climate change (Linnenluecke, Birt and Griffiths, 2015). Most companies have not taken concrete actions to reduce activities that exacerbate the impacts of climate change (Linnenluecke, Griffiths and Mumby, 2015). According to Rezai, Taylor, & Foley (2018), companies worldwide will suffer a fall in profitability, investment, and productivity if carbon emissions rise over the long term. Therefore companies must pay more attention to the environment while operating. In general, companies will focus on responding to changes in business conditions, such as technology, the presence of competitors, and new regulations, over the short term (Linnenluecke, Birt and Griffiths, 2015). Long-term changes, such as natural changes, do not receive greater attention from management than short-term change (Linnenluecke and Griffiths, 2013).

The Indonesian government has taken steps to lessen the effects of climate change by signing international agreements like the Kyoto Protocol in 1994 and the Paris Agreement in 2015 (Nursulistyo & Aryani, 2023). Even though some researchers such as (Rosen, 2015) and Prins & Rayner (2008) seen Kyoto Protocol as a failure, the Indonesian government still set several regulations in response to the agreement. In Indonesia, regulations related to environmental and social issues began in 2007. It started when the Government of Indonesia issued regulation Number 40 of 2007. Then in 2011, the government issue Presidential Decree No. 61 of 2011 concerning the National Strategic Plan for Reducing Greenhouse Gas Emissions and Presidential Decree No. 71 of 2011 regarding the Implementation of the National Greenhouse Gas Inventory. This regulation contains government plans with strategies, programs and activities to reduce carbon emissions, and parties appointed responsible for the activities and programs announced (Nainggolan & Rohman, 2015).

Even though the Indonesian government has made several regulations related to reducing carbon emissions, the disclosure of carbon emissions remains voluntary. The Indonesian government still needs to mandate that companies report the use of carbon generated from their operational activities through sustainability reports (Astiti & Wirama, 2020). Generally, companies do not publish sustainability reports because the regulation does not oblige them to publish the report. As a result, companies do not put mitigating the climate change effect as a primary focus to be solved immediately. Until today, only banking industries have to report their carbon emission activities through sustainability reports, which are covered under Financial Services Authority Regulation Number 51/POJK.03/2017 regarding the implementation of sustainable finance for financial service institutions, issuers, and the

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public. This situation is found in Indonesia and most developing countries, where efforts to lessen the effects of climate change have received little attention (Erwin, 2020).

Indonesian businesses must take several proactive measures to lessen the greenhouse effect. These actions can be carried out starting from operational improvements, asset renewal to lower pollution levels, application of green technologies, and reporting operational activities involving the environment. Accounting, as a social science, may serve society and the environment by, for example, avoiding the depletion of natural resources, implementing green practises throughout the manufacturing process, maximising production efficiency, and disclosing gas emissions (Hopper, 2019). Over the past thirty to forty years, there has been a sharp increase in the use of sustainability reporting as a response to requests for increased corporate accountability for environmental impacts (Al Hawaj & Buallay, 2022; Solomon, Solomon, Norton, & Joseph, 2011).

Research is crucial to help the government's efforts to lessen climate change's effects. In light of the regulations governing sustainability reports, which are still voluntary, it is crucial to understand the factors influencing companies' decisions to disclose their carbon emission through the sustainability report. According to Hermawan *et al.*, (2018), several factors that influence the disclosure of carbon emissions in its financial statements are regulators, company size and profitability. Meanwhile, according to Bae Choi, Lee, & Psaros, (2013) and Faisal, Andiningtyas, Achmad, Haryanto, & Meiranto (2018), the disclosure of carbon emissions is affected by profitability, debt, company size, and industry. Moreover Anggraeni (2015) and Ulum, Agriyanto, & Warno (2020) argue that a firm's value also affects its decision to disclose its carbon emission. In another research, Mujiani et al., (2019) state that profitability negatively affects carbon emission disclosure. In contrary Saraswati, Amalia, & Herawati (2021) said that profitability positively affects carbon emission disclosure. Previous studies on Indonesia's disclosure of carbon emissions have yielded conflicting results; as a result, more research is necessary.

Most previous research focuses on specific industries, such as mining and manufacturing, in less than five years, while this research focuses on the entire non-bank industry for nine consecutive years. It is hoped that it can fill the research gap, especially in illustrating the transformation of a sustainability report in Indonesia. This research aims to identify the factors of carbon emission disclosure and analyze the changes in how companies report their sustainability reports in the last nine years. This study primarily contributes by highlighting and debating empirical data about carbon emission disclosure in Indonesia. As a result, the findings of this study may help businesses disclose their carbon emissions and also help the government to create regulations for carbon emission disclosure.

This paper will be organized as follows: it will start with an introduction, then move on to a theoretical framework and hypothesis generation, then research methodologies, results, and discussion, and finally, draw a conclusion and propose some potential follow-through research.

METHOD

This research is correlational to see the relationship between the dependent and independent variables. The population in this study are all companies listed on the Indonesia Stock Exchange for the period 2013-2021. The sample is selected using a non-probability sampling technique using the purposive sampling method, with specific considerations. Table 1 below describes the detailed sample selection procedure.

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Table 1. Sample Selection

Description	Total Samples
Non Finance companies listed on the IDX from 2013 to 2021	595
Companies that do not publish a complete sustainability report from 2013 to 2021	(579)
Non-financial companies that are not listed in the attachment to the Decree of the Minister of Environment and Forestry of the Republic of Indonesia concerning the Results of the Assessment of Company Performance Ratings in Environmental Management 2013 to 2021	(2)
The number of companies that meet the criteria	14
Total samples (14 x 9)	126

Variable Measurements

The dependent variable in this research is carbon emission disclosure. This research employs Carbon Emission Disclosure Index employed by (Bae Choi et al., 2013) as an indicator. While the independent variable namely industry type is assessed by using dummy variable where environmentally sensitive industry will be given 0 and non environmentally sensitive industry will be given 1. Moreover, the variable profitability will be use return on asset as an indicator. The PROPER score will be used for environmental performance, with gold receiving a score of 5, green receiving 4, blue receiving 3, red receiving 2, and black receiving 1. Table 2 below describes the operational variables used in this research.

Table 2.
Operational Variables

Variable	Indicator	Reference
Industry Type	Dummy Variable: Environmentally sensitive industry: 0 Non-Environmentally sensitive industry: 1	(gunarathne, lee and hitigala kaluarachchilage 2021)
Profitability	Return on Assets	(Hermawan et al., 2018)
Environmental Performance	Score PROPER: gold = 5 green = 4 blue = 3 red = 2 black = 1	(Nurlis, 2019)
Carbon Emissions Disclosure	Carbon Emissions Disclosure Index (CEDI)	(Bae Choi et al., 2013)

Model Specification

Below is a regression model to evaluate how the disclosure of carbon emissions affects industry type, profitability, and environmental performance:

$$\text{CEDI} = \beta_0 + \beta_1 \text{TOI} + \beta_2 \text{ROA} + \beta_3 \text{EnvPer} + \varepsilon$$

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Where:

CEDI	: Carbon Emission Disclosure Index
β_0	: Constant (intercept)
β_1 to β_3	: Regression Coefficient
TOI	: Type of Industry
ROA	: Return on Asset
EnvPer	: Environmental Performance
ε	: Error

Descriptive Statistics

The public's access to environmental data through annual and sustainability reports is advancing. Each company, however, uses a different delivery strategy. As a result, it is neither uniform nor comparable. There are 109 firms listed on the stock exchange that publish annual financial reports continuously starting in 2013 through 2021, according to the selected sample criteria. However, over the observation period, just 18 non-finance companies regularly produced sustainable reports. Of these companies, only 14 have a PROPER score. The total number of samples used in this investigation is 126. The 14 companies tested operate in various sectors, as shown in Table 2 below.

Table 3.
Industry Type

No.	Company	Industry Type
1	Indika Energy	Coal Production
2	Bukit Asam	Coal Production
3	Indocement Tunggal Prakarsa	Construction Materials
4	Solusi Bangun Indonesia	Construction Materials
5	Aneka Tambang	Diversified Metals and Minerals
6	Vale Indonesia	Diversified Metals and Minerals
7	Timash	Diversified Metals and Minerals
8	Astra International	Multisectors Holdings
9	Perusahaan Gas Negara	Oil and Gas Storage Distribution
10	Petrosea	Oil, gas and Coal Equipment and service
11	Indah Kiat Pulp and Paper	Basic Materials
12	Astra Agro Lestari	Consumer-Non Cyclicals
13	SMART Tbk	Consumer-Non Cyclicals
14	Indofood CBP Sukses Makmur	Consumer-Non Cyclicals

Table 3 above demonstrates that most businesses that consistently submit sustainability reports and participate in the Ministry of the Environment's PROPER program are engaged in the manufacturing and oil and gas sectors. The type of industry is divided into two categories in this study, namely:

1. Mining and petroleum businesses

2. Non-mining and petroleum companies

The operational activities of mining and oil companies, which include land clearing, drilling for oil, and soil excavation, directly affect the environment. Despite the fact that the core business operations of non-mining and non-petroleum companies do not directly harm the environment, there is still a need for environmental protection.

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There are seven mining and petroleum companies and seven non-mining and petroleum companies based on the chosen sample.

Profitability

In this study, profitability is measured by using the ratio of Return on Assets (ROA). The profitability shown by the companies in the sample varies from year to year. The biggest loss was experienced by PT Aneka Tambang in 2015 with an ROA of -5.5%. Although the sales of PT Aneka Tambang at that time increased by 12%, the cost of goods sold is also increased by 15%. This is due to the increase in the cost of processing precious metals. In addition, the strengthening of the United States dollar made interest costs rise by 95.24%.

On the other hand, Perusahaan Gas Negara experienced the largest profit in 2012 with an ROA of 30.42%. The increase in profits was due to the efficiency efforts made by the company as well as the increase in natural gas prices. The average profitability during observation can be seen in table 4 below:

Table 4
Profitability

No.	Company	Average Profitability During Observation
1	Indika Energy	3.12%
2	Bukit Asam	15.6%
3	Indocement Tunggal Prakarsa	12.78%
4	Solusi Bangun Indonesia	2.32%
5	Aneka Tambang	2.29%
6	Vale Indonesia	2.56%
7	Timash	3.29%
8	Astra International	8.11%
9	Perusahaan Gas Negara	10.03%
10	Petrosea	3.06%
11	Indah Kiat Pulp and Paper	3.42%
12	Astra Agro Lestari	8.6%
13	SMART Tbk	5.33%
14	Indofood CBP Sukses Makmur	12.4%

On average, the companies sampled in this study have a profitability of 6.64%. Only 6 out of 14 companies had profitability above the average, with PT Bukit Asam being the most profitable company in this sample.

Environmental performance

Environmental performance is marked by a PROPER score issued by the Regulation of the State Minister of the Environment every year. In general, the company is in the Blue and Green category. Several companies such as Indika Energy, Bukit Asam, Indocement and Solusi Bangun Indonesia have the Gold category in several periods. The blue category indicates that the company has made the required environmental management efforts in accordance with the provisions or regulations required by the Ministry of Environment, at least in the fields of:

1. Water governance assessment
2. Land damage assessment
3. Marine pollution control
4. B3 waste management
5. Air pollution control
6. Water pollution control
7. AMDAL Implementation

Meanwhile, the green category indicates that the company has carried out environmental

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management more than what is required, namely having the management of:

1. Biodiversity
2. Environmental management system
3. 3R solid waste
4. 3R of B3 limbah waste
5. Conservation of reducing the burden of water pollution
6. Emission reduction
7. Energy efficiency

The Gold category is the highest achievement which indicates that the company's performance is very good because the company has carried out environmental management more than required and made efforts to develop the community on an ongoing basis.

In general, companies are trying to improve their environmental performance. This can be seen from the better PROPER score obtained by the company every year.

Carbon Emissions Disclosure

Several indicators indicate the disclosure of carbon emissions. This study uses a carbon emission disclosure checklist designed by (Bae Choi et al., 2013) to determine how much effort a company makes in disclosing its carbon emissions. The highest score of this index is 18, and the value 0 is the lowest. The company's efforts to disclose carbon emissions yearly have increased. The effort can be seen from the disclosure number, which shows that the number of disclosures is increasing yearly. The company seeks to quantify the use of renewable energy and the emission of carbon emissions from the company's operations. Figure 4 below shows the trend of carbon emissions disclosure during observation. Generally, there is a positive trend where companies tend to disclose carbon emissions more in 2021 compared to 2013.

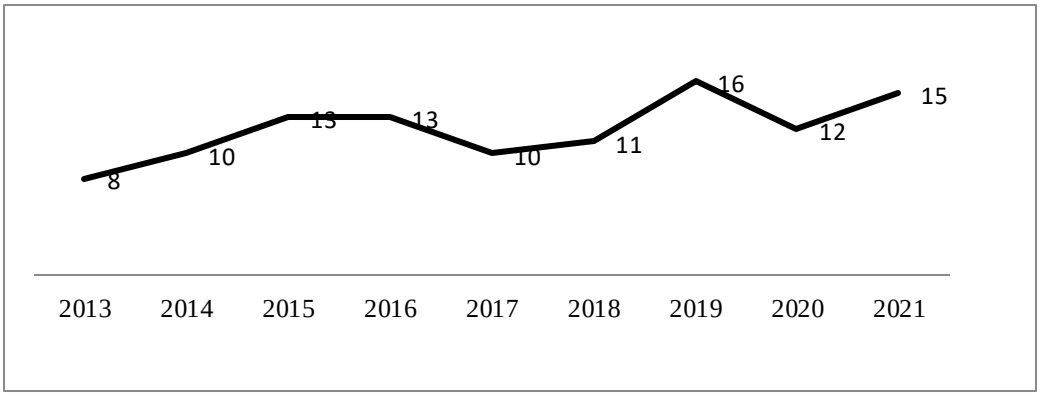

Figure 2. Average Carbon Emission Disclosure

Hypothesis Testing

Before testing the hypothesis, it is necessary to test the classical assumptions first to ensure that the linear regression model is free from classical assumption problems. The normality test is intended to test the distribution of data that has been normally distributed. One way to test for normality is to use the Monte Carlo test, where the data is said to be normal if it has a value above 0.05 (Ghozali, 2013). At the beginning of the test, the data were not normally distributed, with a significance level of 0.04. Therefore the extreme data were excluded with the help of descriptive analysis in the SPSS menu. Data with a Z value of more than 2.5 and less than -2.5 were excluded from the sample. This treatment caused ten extreme samples to be excluded, so further processed samples amounted to 116. After that, the data was tested again and declared normal with a significance value of 0.07.

The heteroscedasticity test assesses whether there is an inequality of variance from the residuals for all observations in the linear regression model. The regression model will be declared valid if this assumption is met.

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In this study, the heteroscedasticity test was carried out using the Glejser test. The results show that the significance value of each variable is more than 0.05; therefore, it can be concluded that the data used does not have symptoms of heteroscedasticity.

This study carried out the autocorrelation test because the data used were time series. This test is intended to determine whether there is a relationship between a period t and the previous period t. A good regression model does not show autocorrelation problems. The results of the run test showed a significant value of 0.762, where this value was greater than 0.05. Therefore, it can be concluded that there is no autocorrelation problem in the data used.

The multicollinearity test aims to test whether there is a strong correlation between independent variables in a regression model. A good regression model must show no correlation between the independent variables. It is shown by looking at the tolerance value and Variance Inflating Factor (VIF) to determine whether the correlation appears. According to Ghozali, (2013), a tolerance value greater than 0.1 indicates no multicollinearity problem in the regression model. When viewed from the VIF, if the VIF value is less than 10, it indicates no multicollinearity problem. The basis for making decisions based on the tolerance value and the VIF value will result in the same decision. After running the test, there is no multicollinearity problem in the data used in this study.

After testing the classical assumptions, it can be concluded that the linear regression model is free from classical assumption problems.

Table 5
Summary of Hypothesis Testing

Variables	Model	t	Significant	Result
Type of Industry	-0.895	-1.69	0.094	Ha Rejected
Profitability	2.093	0.465	0.643	Ha Rejected
Environmental Performance	-0.814	-2.086	0.039	Ha Accepted
R square	0.067			

Test of Hypothesis one (H_1)

The results of statistical tests of industry type variable show a significance value of 0.094 with a negative beta, meaning that the type of industry has a significant negative influence on the company's decision to disclose carbon emissions with a confidence level of 10%. This indicates that companies in industries other than mining and oil disclose more carbon emission information in their sustainability reports. Non-mining and oil companies can reduce carbon emissions from each of their operational activities more easily. In addition, it is easier to mitigate the risk of environmental damage caused by these companies' activities. As a result, it is easier for companies in this category to disclose their carbon emissions, as their operational processes are cleaner and less harmful to the environment than those of mining and oil companies.

Test of Hypothesis two (H_2)

the results of statistical tests for variable profitability show a significance value of 0.643, which means that profitability does not have a significant effect on the disclosure of carbon emissions. In this study, the company does not consider profitability as a factor in determining how much carbon emission information to include in its sustainability report. This indicates that consumers in Indonesia have not given companies that are attempting to communicate their efforts to reduce carbon emissions as a factor in purchasing

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their products added value.

Test of Hypothesis three (H3)

the results of statistical tests for variable environmental performance show a significance value of 0.039 with a negative beta, which means that environmental performance has a significant negative influence on the company's decision to disclose carbon emissions. The samples selected in this study have environmental performances of blue, green, and gold. In other words, no company has a poor environmental performance. The objective environmental performance should be understood as the minimization of the negative impacts of a company's production activities on the natural environment and the social perception of this impact. Environmental performance cannot be evaluated in isolation from other operational goals. By disclosing their operational activities related to carbon emissions, these businesses strive each year to continuously improve their environmental performance. However, due to the nature of their operational activities, oil and mining companies disclose fewer carbon emissions than other companies. Therefore, the less they disclose their carbon emissions (within the average range), the better their environmental performance will be.

CONCLUSIONS

From the results of the research conducted, it can be concluded that only environmental performance has a significant negative influence on the company's decision to disclose carbon emissions. While the type of industry has a significant negative effect with a degree of confidence of 90%. While the profitability variable has no effect on the disclosure of carbon emissions. The result of this research imply that the criteria for evaluating PROPER will need to be reevaluated in light of the government's practical considerations.

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