



# Media of Carbon Emissions Disclosure and Return on Asset Operations in State-owned Enterprises Public Company

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Received: 08 February 2022

Accepted: 27 April 2022

DOI: <https://doi.org/10.32479/ijeep.13012>

## ABSTRACT

The disclosure of carbon emissions information must be presented based on the Circular of Financial Services Authority No.30/SEOJK.04/2016 on the public companies including social and environmental responsibility reports in their Annual or Sustainability Reports. Therefore, the State-Owned Companies (BUMN), as the state-owned business entities listed on the Indonesia Stock Exchange (IDX), must indeed disclose their carbon emissions for their business operations. Therefore, this research aims to examine the extent of carbon emissions disclosure in the state-owned enterprises listed on the IDX studied from their websites and influence from the rate of return on their assets. The research uses the data from state-owned companies listed on the IDX from 2016 to 2019. It examines the multiple linear regression techniques. The Result looks that websites have a significant negative effect on the extent of carbon emission disclosure. Meanwhile, the return rate on the operating assets has no significant impact on the scope of disclosure of carbon emissions information.

**Keywords:** Disclosure, Carbon Emissions, Websites, Rate of Return on Assets

**JEL Classifications:** F64, F65, L21, L26

## 1. INTRODUCTION

Climate change has been on the political and business agendas for many years (Li et al., 2017; Nugroho et al., 2019). Global economic development, directly and indirectly, impacts the emergence of significant environmental problems (Freedman and Park, 2014). Previous research results prove that carbon emissions, especially CO<sub>2</sub>, are the main factor that contributes most to global warming and encourages climate change (Peng et al., 2015; Renukappa et al., 2013). Many companies have realized and carried out activities to reduce their carbon emissions to survive (Aguilar-Hernandez et al., 2021; Arafah et al., 2018). However, many of them fail to manage the impacts of their business operations on the environment. They will face risks if they make environmental disclosures and tend to disclose in

more limited/less scope, even reluctant to admit it (Linnenluecke et al., 2015).

It all started from the United Nations Framework Convention on Climate Change (UNFCCC), which created an international amendment known as the Kyoto Protocol to reduce greenhouse gas emissions. In Indonesia, the first period of the Kyoto Protocol was ratified on June 28, 2004, by Law No. 17 of 2004, followed by the second one on September 30, 2014 (Labetubun et al., 2022). Presidential Decree No.61 of 2011 continued the commitment to reduce carbon emissions. This commitment was included in PSAK 1 on the disclosures regarding social and environmental activities. In addition, it was contained in a Circular of Financial Services Authority No.30/SEOJK.04/2016 that explained public companies' obligation to include Social and Environmental Responsibility

Reports in their Annual or Sustainability Reports (Nugroho et al., 2018). These regulations apply to public companies, including those with the status of state-owned enterprises (BUMN).

State-owned companies operate as instruments of the country in achieving the prosperity of its people. However, as public companies, state-owned companies can also accumulate profits from working their assets. Therefore, the companies seek to allocate resources optimally and increase stakeholder engagement as part of their legitimacy strategies (Greco et al., 2012). Disclosure of environmental information concerning reducing carbon emissions is a corporate legitimacy strategy that will demonstrate to stakeholders. The state-owned companies are expected to provide information on carbon emissions connected with their operational activities as environmental sustainability responsibility. Therefore, the state-owned companies are also considered the most necessary to make adequate environmental disclosure (Frost and Seamer, 2002; Guthrie et al., 2010; Lodhia et al., 2012). Nevertheless, previous studies have shown a low level of disclosure in the sustainability report, containing environmental and social information (Guthrie et al., 2010; Lu et al., 2020; Marcuccio and Steccolini, 2009).

Furthermore, according to Kaur and Lodhia (2014), stated that disclosing information about the environment is considered low and slows because the company has not been able to identify stakeholders' information needs. Moreover, there must also be specific information regarding carbon emissions resulting from the company's operations. Kaur and Lodhia (2014) also explain the lack of transparent communication. Therefore, online media and the internet should be used as the primary media (Bairizki et al., 2021; Zamzami et al., 2021). The internet has increased sustainability reporting relevance compared to printed reports (Irwansyah et al., 2021; Nugroho, 2021). It motivates the need to research the low disclosure of carbon emissions due to its operational activities.

This research attempts to link previous studies regarding sustainability reports to types of government businesses/institutions (Brown et al., 2009; Burritt and Welch, 1997; Marcuccio and Steccolini, 2009) with the research on the relevance of the internet in disclosing sustainability reports which are outside of the government institutions (Alcaraz-Quiles et al., 2015). This research also tries to answer Kaur and Lodhia (2014) regarding the lack of a transparent communication process regarding the sustainability reports of government agencies to their stakeholders through website disclosure media.

Based on the findings of previous studies that have been revealed, this study seeks to link the results of these studies and find a "puzzle" to be traced so that it can be investigated further. In previous studies, the research object has not focused on the specificity of seeing the urgency of disclosing carbon emission information to government agencies, still on the Sustainability Report, which contains environmental and social information. Furthermore, the previous study's government institutions were government institutions that were not listed in the stock exchange category. On the other hand, Indonesia has state-owned enterprises

(BUMN), which are also listed on the stock exchange. These types of companies certainly have more complex responsibility consequences, considering that these State-Owned Enterprises must align the information needs of stakeholders with different orientations, namely those who are profit-oriented and those who are oriented towards conducting business activities for the welfare of the people in general. Thus, this research investigates how the operating profit level of public BUMN assets and website disclosure media influences, as a response to access, answering the slow and unclear communication process as revealed by Kaur and Lodhia (2014) on the extent of disclosure of carbon emission information.

## 2. HYPOTHESES DEVELOPMENT AND THEORIES

In this case, the organization seeks to create harmony between the social values inherent in its business operations with the norms of behavior in the social system of society. The boundaries set by social norms encourage the company's reaction to always be in harmony with the standards. If there is a difference in response, the company usually faces demands from the local people. Therefore, it encourages it to gain legitimacy to operate and run its business programs smoothly (Bäckstrand et al., 2013; Nugroho, 2014).

A company in the middle of society also must protect the environment where it operates and its surroundings, even the earth where the company is located. It is expected to pursue profits and provide social benefits and preserve the environment for stakeholders' survival (stakeholder theory). One of them is an effort to minimize carbon emissions from its operations.

One thing that human activities cannot avoid is carbon emissions. However, carbon emissions can be minimized in a natural process through specific actions to reduce carbon emissions, such as planting trees and using filters for harmful gases. Carbon emissions are the release of gases containing carbon into the atmosphere. The release occurs because of the combustion process of carbon, either in single or compound form. Greenhouse gases stated in the Kyoto Protocol include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitro oxide (N<sub>2</sub>O), chloro-fluoro-carbon (CFC), hydro-fluorocarbons (HFCs), and sulfur hexafluoride (SF). The leading greenhouse gases are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. The most abundant gas in the atmosphere is CO<sub>2</sub>, and it increases significantly every year. In addition, the combustion of fossil fuels such as coal, gasoline, and petroleum is a source of growing energy demand and the growth of human technology in industrial activities (Utami et al., 2021).

Based on the source, the greenhouse gases can be divided into two, namely natural and industrial greenhouse gases. Natural greenhouse gases are part of a natural cycle that plants and oceans can quickly neutralize. They are beneficial for living things because they can keep the earth's temperature warm in the 6°C range. Meanwhile, industrial greenhouse gases come from industrial activities carried out by humans. Human activity makes carbon dioxide levels denser, so the natural environment cannot absorb all available carbon dioxide, and ultimately excess carbon occurs

(Nugroho et al., 2017). Therefore, greenhouse gases are the most significant cause of global warming, increasing from time to time, starting at the regional, national, and global levels.

With carbon emissions as a significant contributor, global warming is the leading cause of climate change. The Carbon Disclosure Project (CDP) summarizes information about climate change in the world. CDP is a non-profit organization with 3000 organizations in 60 countries (Depoers et al., 2016). CDP begins to trace the amount of carbon emission in many companies, organizations, regions, cities through 5 categories of 18 disclosure identification items, namely: risks and opportunities of climate change (CC/Climate Change), greenhouse gas emissions (GHG/Greenhouse Gas), energy consumption (EC/Energy Consumption), reduction of Green House Gas, as well as costs (RC/Reduction and Cost), and accountability of carbon emissions (AEC/Accountability of Emission Carbon).

Therefore, since 2007, the Government of Indonesia, through the Law No.40 of 2007 article 66c, has obliged all companies to submit their reports on social and environmental responsibility activities in their Annual Report. This was followed by the ratification of the Presidential Regulation No.61 of 2011 concerning the National Action Plans for Reducing Greenhouse Gas Emissions and the Presidential Regulation of 2011 regarding the Implementation of the National Greenhouse Gas Inventory issued to reduce carbon emissions. Furthermore, these regulations were affirmed by the Circular of Financial Services Authority No.30/SEOJK.04/2016 regarding public companies' obligation to include Social and Environmental Responsibility Reports in their Annual Reports. However, these regulations do not have detailed directions on what to disclose, especially regarding carbon emissions information.

The purpose of all these regulations is to ensure that the companies that run their operational activities do not damage the living environment in which the surrounding community lives. They are also reminded of business sustainability that adheres to the triple bottom line principle (Elkington, 1998). Achievement of economic performance must always be in line with the synergy in environmental and social performance preservation as a form of their responsibility. Stakeholders feel the need to know information about the companies' social and environmental responsibility. Therefore, appropriate media should make it easy for them to access information quickly (Cahan et al., 2015).

In the current era of openness and rapid technological changes, the stakeholders must immediately obtain the necessary information. Lei et al. (2019) and Wang et al. (2016) stated that online media is currently the fastest solution to get such information. In addition, the internet has been shown to increase sustainability reporting relevance (Manetti and Bellucci, 2016). Based on these conditions, the company's website is the most appropriate place for the stakeholders to obtain the specific information they need (Troise and Camilleri, 2021). Therefore, most stakeholders will immediately go to the company website for information, and it is undoubtedly much more efficient because there is no cost for printing reports. In addition, it will significantly assist the company in making voluntary disclosures that have not been yet regulated in detail.

The company's decision to disclose voluntary carbon emission information provides concessions for it that do has challenges that disclose carbon emission information not regulated in a clear and detailed manner as well as to balance the need to achieve financial goals from the results of operating assets as a public company and the limited resources for carbon emission reduction activities (Hao et al., 2021). Thus, it is not surprising that in the research by Jiang et al. (2019), it is found that many companies in developing countries tend to have a low commitment to carbon reduction efforts and disclose carbon emission information, considering that extra costs will arise in fulfilling carbon emission reduction activities and disclosures.

Furthermore, the development of internet technology in tracking information verification activities encourages companies to be more careful in presenting their carbon emission information disclosures. Therefore, although internet support through the companies' websites helps them disclose carbon emission information more efficiently, the classified information may be easily traced. Also, the disclosure of carbon emission information is not requested in detail in Indonesia's applicable regulations. Thus, the companies will just prepare minimal disclosures to fulfill their obligation to provide environmental information to the stakeholders (Huang and Kung, 2010).

Based on some phenomena above, this research tries to develop a hypothesis as follows:

Hypothesis 1: The companies will tend to disclose less carbon emission information on their websites.

The factors causing the company's low commitment to disclosing carbon emission information is that extra costs that shall arise, so it is assumed that if the company has been successfully obtaining a level of profit from operating its assets, it can eliminate the problem of extra costs arising from carbon emission reduction activities and tend to disclose more information about it.

This condition can support the company's legitimacy because it can prove that its operational activities are running smoothly and profitably without damaging the environment (Li et al., 2017). The companies with a better return on operating their assets can fund their environmentally friendly assets. They ensure that their business assets in the form of environmentally friendly production machines are equipped with pollution filtering technology and work processes that pay attention to the sustainability of the beautiful environment through tree planting activities but can still increase profits. Nevertheless, the assumption that the companies that have a higher level of profit will be better able to respond to the pressure from stakeholders to disclose carbon emission information to their asset operation activities adequately, this research tries to develop a hypothesis:

Hypothesis 2: The companies with a higher operating profit level on assets will provide more information on their carbon emissions.

### 3. METHOD

This research population is 25 state-owned companies listed on the IDX taken using the purposive sampling method. Based on

the research objectives, the companies selected to be the research samples are all the state-owned that have issued their Sustainability Reports from 2016 to 2019. The 2016 period is chosen as the beginning of the research period following the Circular of Financial Services Authority No.30 issued in 2016. Currently, the available reports were the Annual or Sustainability Reports in 2019. As a result, 15 state-owned companies have completed their Sustainability Reports from 2016 to 2019. The following details: 2 pharmaceutical companies, four mining companies, construction companies, one infrastructure company, one telecommunication company, two cement companies, and one transportation company.

Based on the proposed hypotheses, this research uses multiple regression testing models. The dependent variable in this research is the extent of carbon emission disclosure using the measurement of 18 carbon emission identification items made by CDP (Depoers et al., 2016). The independent variables that will be a proxy for testing the two hypotheses are:

- The return on assets variable is used to measure the level of profit from operating business assets
- The dummy variable is used to measure whether the company discloses its carbon emission information through its website to assign a value of 1 and 0 for others

This research will also use a control variable, Ln Total Assets, to proxy for public state-owned companies' size.

The research model that will be used to test these two hypotheses is:

$$PEK = \alpha_0 + \beta_1 \text{Media} + \beta_2 \text{ROA} + \beta_3 \text{LnTA} + \epsilon \tag{1}$$

Remark:

PEK=Disclosure of Carbon Emission;

Media= Company's website;

LnTA = Log Natural Total Aset.

Before testing the research model, a series of BLUE tests (best linear unbiased estimated) have been conducted to ensure no problems related to heteroscedasticity, autocorrelation, and multicollinearity.

## 4. RESULTS AND DISCUSSION

Based on the 15 state-owned companies as the research sample, the data show that many public state-owned companies have not yet fully provided adequate carbon emission information using the CDP identification items (Table 1). The Circular of Financial Services Authority No.30/2016 does not state what the CDP stated in detail. The state-owned companies' average disclosure of carbon emissions is about 61% of the total CDP identification items. This figure shows that the companies' related government regulations are gradually

**Table 1: Data descriptions**

Variable	Minimum	Maximum	Mean	Modus	Std. Deviation
PEK	0.06	0.94	0.61	-	0.20
MEDIA	0	1	-	1	-
ROA	(0.06)	0.34	0.06	-	0.07
TA	9.44	32.20	17.18	-	6.60

applied, although they have not been regulated in detail. Indeed, some almost wholly disclose their carbon emission information based on CDP, as much as 94% of the total CDP identification items. However, some only tell 6% of the 18 items. This research's carbon emission disclosure data characteristics seem to be slightly higher than the previous ones (Guthrie et al., 2010; Marcuccio and Steccolini, 2009). It is allegedly caused by the companies that already know what kind of information the stakeholders want compared to previous studies.

The data regarding the media for disclosing carbon emissions shows that many companies have displayed their carbon emission information on their website. Approximately 60% of the sample have disclosed carbon emissions through their websites. This indicates that the stakeholders are increasingly aware of the benefits of online information disclosure. Printing efficiency also plays a role in preserving the environment. The findings support the results of Cahan et al. (2015).

Furthermore, the data regarding the level of profit a company obtains through its assets shows that the average rate of profit from operating assets is only around 6%. This is due to the large number of public state-owned companies that have reported losses for several years, and the highest profit rate is only around 34%. Therefore, it is not too surprising considering that they prioritize the use of the state and tend not to have high-profit targets.

The data are then tested using BLUE (classical assumption) to ensure no problems during the hypotheses. The normality test shows that the data residue is normal. The results are shown in the following Kolmogorov-Smirnov test results (Table 2), which show asymp. Sig is higher than 5%.

Furthermore, to ensure an inequality of variance from the residuals of one observation to another in the regression model, this research uses the Spearman's rho correlation test that shown in Table 3.

The heteroscedasticity test results show that all sig values are higher than 5% for all variables to be used for testing (Table 3). This is because all variables have inequality of residual variants from one observation to another and homoscedasticity. The run-test results show a sig value higher than 5% for the autocorrelation test, which means that the research data used have random residues (Table 4).

The multicollinearity test results also show that the VIF value of all tested variables does not exceed 10, which means there is no correlation among the independent variables (Table 5).

### 4.1. Hypotheses Testings

After ensuring that all collected data do not contain normality, heteroscedasticity, autocorrelation, and multicollinearity issues, the next step is to test the research model. The results show that the F-sig value is lower than 5%, which means the research model fits the test model. Furthermore, the R-Square value of 20.4% indicates that the two tested variables and one variable control influence 20.4% to the extent of disclosure of carbon emissions.

The results of multiple regression testing show that among the t-sig values of the two hypothesized variables, it is only the Media

variable whose t-sig value is lower than 5%. This means that, empirically, a website is proven to have a significant adverse effect on the extent of disclosure of carbon emissions. Meanwhile, the ROA variable empirically performs little influence on the scope of disclosure of carbon emissions. Meanwhile, the Ln Total Asset control variable has a significant positive effect on the extent of carbon emissions disclosure.

Based on the results of the hypotheses testings, the first hypothesis is accepted. Many public state-owned companies have disclosed their carbon emissions through their websites, as found in the research of Cahan et al. (2015) and Bae Choi et al. (2013). However, easy access to carbon emission information obtained from the websites has reduced the extent of carbon emission information by 14.9%.

From 61% of the sample, several companies only disclose information on their carbon emissions in the last 2 or 3 years. This shows a good direction if there is consistency in disclosing the information related to carbon emissions. However, some are inconsistent in disclosing carbon emissions every year. This should concern the government, considering that the companies are state-owned listed on the stock exchange. As the state-owned companies, they indeed have more pressure on information disclosure as a form of corporate legitimacy because they are monitored by stakeholders who have different orientations; profit-oriented and those oriented towards maximum use for the people's welfare.

Hypothesis 1 testing results show that the state-owned companies that disclose their carbon emission information on their websites have four reasons for disclosing fewer carbon emissions information. First, the government does not have detailed rules regarding disclosing items as the primary stakeholder. Second, the Circular of Financial Services Authority No.30/2016 does not have details of activities that must be informed by public companies, including the public state-owned. Because the companies studied in this research are presumed not to benefit from disclosing their information on carbon emissions from their operational activities. They consider that the disclosure of carbon emissions does not have any relevant power to make decisions. Their awareness of identifying their contribution to global warming is not yet fully realized. Third, the companies may lack the resources for carbon emission reduction activities and are less successful in managing the impacts of their business operations on the environment, so they will face risks if they make environmental disclosures and tend to disclose it in more limited scopes and become even reluctant to conduct it (Holden et al., 2017). Fourth, the companies also consider the power of confirmation in the current information and technology development era, which is incredibly fast-growing and changing. Therefore, they will only disclose information on carbon emissions, which tends to have a relatively small risk of confrontation with the stakeholders. Based on the theory of legitimacy, this research shows that companies are trying to minimize legitimacy risk when they have poor carbon emissions information. There is a possibility that they will not disclose this information because they will get pressure from the stakeholders. Their unpreparedness to face pressure from

their stakeholders may encourage them not to disclose carbon emission activities on their websites.

The disclosure of carbon emissions on the companies' websites is considered a form of compliance with the laws on the companies, presidential regulations, and the Circular of Financial Services Authorities. The disclosure quality has not yet reached what all stakeholders consider essential. The revelation of carbon emissions has partially met the regulations. It is especially evident in the disclosure on the websites, which shows that the companies have acted according to information needs related to carbon emissions. So, the community will feel safe enough by their actions that seem to care about their surrounding environment (Renukappa et al., 2013).

Meanwhile, the profit level from the results of operating assets, which was initially thought to trigger the companies to broadly disclose the carbon emissions information as stated by Li et al. (2017), apparently shows different results from the testing of hypothesis 2. First, it empirically shows that the profit level from operating assets has an insignificant negative effect. It means that the profit level, whether high or low or even at a loss, does not determine the number of companies disclosing their carbon emissions information.

Extra costs for disclosing carbon emission information can be covered by the profitability of operating assets using environmentally friendly production assets. For example, a series of tree planting activities are shown to have insignificant effects. However, as the majority-owned business entities by the government, the state-owned companies must obey all applicable rules. Thus, operational activities are carried out as the state instruments in providing state administration for the people's welfare. Therefore, the profit level from operating the assets must not be a benchmark for disclosing carbon emission information.

The companies' awareness and commitment to make ideal carbon emission disclosures will significantly assist the stakeholders in making important decisions. The consequences of using asset operations that can trigger significant amounts of carbon emissions will be considered as long as the assets' operating activities benefit the stakeholders. As state-owned business establishments, the companies must benefit the entire community. The regulations on carbon emission disclosure that are not too detailed and have no quality consequences make them see that more or less-detailed carbon emissions disclosure is less critical. Therefore, they will prepare the disclosure just the way it is.

This issue should make the regulators pay more attention to the quality of disclosure expected for the stakeholders. The companies must be classified based on the types of operations of their business assets. The disclosure of carbon emissions in manufacturing companies may have different disclosure targets from those in the banking industry. It is expected that the regulations on the disclosure can be more understandable because it is under the levels of carbon emissions.

This research also uses total assets as a proxy for the company's size as a control variable. The test results show the consistency

**Table 2: Normality test results**

		Unstandardized residual
N		60
Normal Parameters <sup>a,b</sup>	Mean	0.00000000
	Std. Deviation	0.18688955
Most Extreme Differences	Absolute Positive	0.090
	Negative	-0.090
Test Statistic		0.090
Asymp. Sig. (2 tailed)		0.200 <sup>c,d</sup>

<sup>a</sup>Test distribution is Normal. <sup>b</sup>Calculated from data. <sup>c</sup>Lilliefors significance correction.

<sup>d</sup>This is a lower bound of the true significance

**Table 3: Spearman's correlation test results**

Correlations	Unstandardized Residual
Spearman's rho	
Unstandardized residual	
Correlation Coefficient	1.000
Sig. (2-tailed)	-
n	60
ROA	
Correlation Coefficient	0.92
Sig. (2-tailed)	0.483
n	60
TA	
Correlation Coefficient	0.009
Sig. (2-tailed)	0.945
n	60
Media	
Correlation Coefficient	0.048
Sig. (2-tailed)	0.716
n	60

**Table 4: Run-test results**

	Unstandardized residual
Test Values	0.00794
Cases<Test Value	30
Cases≥Test Value	30
Total Cases	60
Number of Runs	24
Z	-1.823
Asymp. Sig. (2-tailed)	0.068

Median

**Table 5: Multicollinearity test results**

Variable	Collinearity statistics	
	Tolerance	VIF
ROA	0.957	1.045
Total Assets	0.971	1.030
Media Exposure	0.936	1.068

**Table 6: Hypotheses testing results**

Variable independent	Coefficients		t	Sig
	B	Std. Error		
Constant	0.576	0.090	6.396	0.000
ROA	-0.050	0.367	-0.138	0.891
TA	0.008	0.004	2.027	0.047
Media	-0.149	0.053	-2.808	0.007
R-Squared - 0.204				
F-statistic - 112.371				
Prob (F-statistic) - 0.000				

Dependent variable: PEK

of the results with the previous ones. The bigger the company, the broader its disclosure of carbon emissions. Large companies tend to be a concern for many stakeholders. An adequate communication medium is required to describe how the companies conduct information disclosure to the stakeholders and get legitimacy from the social system.

## 5. CONCLUSION

This research aims to empirically investigate the tendency of the public state-owned companies to disclose their carbon emissions information based on the CDP items identification list, which is reviewed from the disclosure of carbon emissions information on the companies' website and the profit level from their assets operational. Of the 15 state-owned companies, it is shown that most of them use their corporate websites to disclose their carbon emissions information, but the extent of the disclosure is declining. Meanwhile, the profit level from operational assets has no significant effect on disclosing carbon emissions information.

The results of this research contribute to the existing regulations related to the disclosure of the Sustainability Report. Environmental disclosure information provides much information regarding carbon emissions desired by the stakeholders, such as written in the list of CDP identification items on the companies' websites. The results also complement the findings of Kim and Kaur, and Lodhia (2014). The results can also be used as a basis for the considerations in evaluating the details of items that should be disclosed by the companies regarding the disclosure of carbon emissions information so that they can disclose it in more understandable and more transparent ways.

However, this research has several weaknesses, such as seeing which components of the CDP item are most affected because the companies make their disclosures through the websites. Further research should be able to see which details of the CDP item are significantly affected because the results are expected to help the government set regulations related to climate change. The subsequent weakness is that this research only focuses on state companies listed on the stock exchange without paying attention to the industrial sector. Future research is expected to see the impacts if each industry is tested separately. The types of carbon emission disclosures can be traced in detail to prepare action plans to reduce carbon emissions for each industrial sector.

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