

Determinants of carbon emission disclosure: An empirical study on Indonesian manufacturing companies

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ABSTRACT

Due to the worsening environmental issues e.g, climate change, the stakeholders impose greater demand and pressure more towards the companies of caring about the environment. The emergence of carbon accounting is a supplement to the adoption of Kyoto Protocol. However, the government has not applied carbon accounting to all companies in Indonesia, because of non-explicit laws and low quality of human resources. Various studies have been conducted to find the determinant factors for companies to make carbon emission disclosure. This research aims at examining the influence of type of industry, profitability, company size, environmental performance, and audit firm reputation on the carbon emission disclosure of manufacturing companies listed on the Indonesia Stock Exchange years 2016-2019. It employed a purposive sampling technique and obtained 290 observations and the data were analyzed using Ordinary Least Square. The shows that type of industry, profitability and company size influence carbon emission disclosure. However, this research does not successfully show the influence of environmental performance and reputation of public accountant office on carbon emission disclosure.

ABSTRAK

Akibat parahnya permasalahan lingkungan seperti perubahan iklim, pemegang kepentingan memberikan tuntutan dan tekanan yang lebih besar pada perusahaan untuk semakin peduli dengan lingkungan. Lahirnya akuntansi karbon merupakan pelengkap dari diresmikannya Protokol Kyoto. Namun pemerintah belum menerapkan akuntansi karbon ke seluruh perusahaan di Indonesia, dikarenakan hukum yang kurang tegas dan kualitas sumber daya manusia yang masih rendah. Penelitian ini bertujuan untuk menganalisis pengaruh tipe Industri, profitabilitas, ukuran perusahaan, kinerja Lingkungan, dan reputasi kantor akuntan publik terhadap pengungkapan emisi karbon perusahaan manufaktur yang terdaftar di Bursa Efek Indonesia tahun 2016-2019. Penelitian ini menggunakan teknik pengambilan sampel purposive sampling dan diperoleh sebanyak 290 pengamatan. Alat analisis penelitian ini menggunakan Ordinary Least Square. Hasil penelitian membuktikan bahwa tipe industri, profitabilitas dan ukuran perusahaan berpengaruh terhadap pengungkapan emisi karbon. Namun, penelitian ini tidak berhasil menunjukkan pengaruh kinerja lingkungan dan reputasi kantor akuntan publik terhadap pengungkapan emisi karbon.

1. INTRODUCTION

The emergence of carbon accounting is a supplement to the adoption of Kyoto Protocol, in which carbon accounting is the process of measuring the amount of carbon emitted by industrial process, determining the target to

reduce carbon emission, and reporting the program development. Kyoto Protocol is the international world's agreement on climate change aiming at reducing the emission of Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Sulfur hexafluoride

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(SF6), Hydro fluorocarbon (HFC), and per fluorocarbon (PFC). This emission is one of the bases of carbon accounting application.

Indonesia has participated in the Kyoto Protocol through the enactment of Law No 17 Year 2004. The government, however, has not applied carbon accounting to all companies in Indonesia, because of non-explicit law and low quality of human resources. Indonesia has also cooperated with Australia and China in carbon trade (Suhardi and Purwanto, 2015). However, Effendi et al. (2012) stated that government regulation actually does not influence the level of environmental responsibility disclosure. This means the existence of company's obligation in government regulation cannot serve as a definite benchmark to influence environmental responsibility disclosure a company needs to do and report of, including carbon emission disclosure. This statement implies that there are some factors which encourage companies to do carbon emission disclosure other than government regulation, both internal and external.

There are some studies on the factors affecting carbon emission disclosure in Indonesia. For example, Jannah and Muid (2014) studied the analysis on the factors influencing carbon emission disclosure in Indonesia in 2010-2012. They found that media exposure, type of industry, profitability, company size, and leverage influence carbon emission disclosure, while environmental performance does not influence carbon emission disclosure in Indonesia. Majid and Ghozali (2015) also found that PROPER classification does not influence carbon emission disclosure, while company size, profitability, and media have a positive and significant influence but leverage has a negative and significant influence. Another study by Suhardi and Purwanto (2015) showed that company size and profitability have a positive and significant influence. The study also showed Leverage and environmental performance do not influence carbon emission disclosure. Besides that, aother proponents such as Prafitri and Zulaika (2016) found that environmental performance, company size, industry type and leverage had significant effect on carbon emission disclosure. Also, Wardhani (2019) found that liquidity, financial performance and audit firms' reputation influence carbon information disclosure. The research conducted by Hermawan et al. (2018) proves that government, company size

and profitability influence carbon emission disclosure, while institutional ownership does not influence carbon emission.

There were also previous studies done by other researchers. For example Ulfa and Ermaya (2019) found that the type of industry and environment performance had no significant influence on the extent of carbon emission disclosure. Hapsari and Prasetyo (2020) show that type of industry and company size positively influence carbon emission disclosure, while leverage negatively influences the carbon emission disclosure of non-financial companies listed on the Indonesia Stock Exchange from 2014-2016. In addition, the research also showed that profitability and corporate governance does not influence carbon emission.

Based on the previous studies, it indicates that there is inconsistency of the result of factors influencing carbon emission disclosure. On this basis, this research aims at testing factors which influence the carbon emission disclosure of manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2016-2019. The factors of which influence is studied are type of industry, profitability, company size, environmental performance, and audit firm reputation.

2. THEORITICAL FRAMEWORK AND HYPOTHESIS

Legitimacy Theory

According to Irwhantoko and Basuki (2016), the legitimacy theory focuses on the relation between company and the society through regulation arranged by the government. In this relation, disclosure serves as the intermediary between company and civil society (Gray et al, 1996). For example, the company desires legitimacy from the society to convince them that its operating activities conform to the norms and limitations based on prevailing provisions (Deegan and Unerman, 2006). The company will, later, voluntarily report its operating activities when the management feels that entity operation is expected by the society. This theory actually seeks for validity of company's operation that, in addition to support from laws and regulations, society's support is also expected in the form of public participation and their non-resistance of company's operation process (pursuant to social values in the society).

Stakeholder Theory

The stakeholder theory shows that parties are responsible in a company (Freeman, 1984). The idea of stakeholder, stakeholder management, or stakeholder approach for a strategic management assets that manager must formulate and apply a process which satisfies all groups having interest in the business. The main duty in this process is to manage and integrate the relation and interest of shareholders, employees, customers, suppliers, community and other groups by ensuring company's long-term success. The stakeholder approach emphasizes active business environmental management, relation and promotion of common interest. This theory does not only view company in operation for its interest, but there are stakeholders that should benefit from the operation process, since the stakeholders are capable of controlling the company's operation including disclosure and putting direct and indirect pressure on the company regarding environmental disclosure.

Carbon Emission Disclosure

Carbon emission can be defined as gases containing carbon emitted to the Earth's atmospheric layers which are commonly derived from combustion process. The Ministry of Environment and Forestry (2018) classifies the gases into CO₂, CH₄, N₂O, HFCs, C₄F₉OC₂H₅, CHF₂OCF₂OC₂F₄OCHF₂, and so on. Carbon emission or greenhouse gas may be divided by source into two, namely natural greenhouse gas and industrial greenhouse gas. The industrial and energy sectors are human activities that produce abundant carbon dioxide. The industrial sector's use of energy from fossil derived fuel such as oil and coal has caused increasing amount of greenhouse gas in the Earth's atmosphere (Ministry of Environment and Forestry, 2018).

Carbon emission disclosure is a type of environmental disclosure. The intensity of GHG emission or greenhouse gas and use of energy, corporate governance and strategy related to the impacts of climate change are covered in environmental disclosure (Cotter et al., 2011). Companies are demanded to be more open regarding information of any activities they do and their form of accountability. The openness of information of company's activities and its accountability is a demand on a company. Information disclosure in annual report is a form of company's transparency and accountability. The information disclosure in

annual report consists of two groups, namely mandatory disclosure and voluntary disclosure (Darrough, 1993). This research reveals the index of disclosure developed by Choi, et al (2013) where this disclosure is designed based on factors identified in the information request sheet developed by CDP (Carbon Disclosure Project).

The Influence of Type of Industry on Carbon Emission Disclosure

Companies—in carbon-intensive industries—have more impact on the environment. Such companies will more voluntarily disclose compared to those which do not produce carbon intensively since these companies have little impact on the environment. There are companies have a major responsibility for the impact of their activities on the environment. They are the companies which are operating in the energy, materials, industrial, basic consumer needs, health, finance, information technology, communications, utilities and real estate.

Based on stakeholder theory, industry which produces carbon intensively will get strict attention from the government and the society and companies integrated in industry. They produce abundant carbon and will make voluntary disclose their operating activities. Emission disclosure is part of environmental disclosure which may be used by company to respond to the pressure. Therefore, the company's activity will receive legitimacy from the society. This evidence was supported by Hapsari and Prasetyo (2020) and Nasih et al., (2019) who found that the type of industry influences carbon emission disclosure. Based on this argument, the hypothesis is stated as follows:

H1: Type of Industry influences carbon emission disclosure

The Influence of Profitability on Carbon Emission Disclosure

Based on the legitimacy theory, the society put pressure on company for they must be more sensitive to environmental issues. The profitability achieved depends on the operational activities made by the company to produce and sell its products or services. Therefore, high profitability indicates operational activity process in the form of high production and selling activities. It is because of the high industrial activity that causes high carbon emission. This leads to the profitability

to become the indicator of the intensity of carbon emission the company produces. With the high profitability, the public will certainly expect that the carbon emission produced is also high. As a form to reduce the pressure, a company may disclose their actual carbon emission. The disclosure will reduce public pressure on the company and may maintain the company's value in the capital market. The research conducted by Suhardi and Purwanto (2015) and Hermawan et al. (2018) show that profitability influences carbon emission disclosure. Therefore, the next hypothesis can be stated as to the following:

H2: Profitability influences carbon emission disclosure

The Influence of Company Size on Carbon Emission Disclosure

A bigger company will have bigger pressure and demand from various parties to do carbon emission disclosure than a small company. A bigger company will have its operation activities equally bigger to their contribution to surrounding environment. Therefore, it will be easy for external parties or the public to pose pressure and demand regarding economic or political aspects on the company to focus more and give their attention more to environmental issues.

The legitimacy theory states that company with bigger operation process will receive higher pressure and attention from the society than small company and is capable of paying more attention to environmental issues, and carbon emission disclosure is company's response to the pressure and demand from the public for its operation activities to be

acknowledged by the public. Suhardi and Purwanto (2015), Hermawan et al. (2018), Hapsari and Prasetyo (2020) and Nasih et al. (2019) successfully prove that company size positively influences carbon emission disclosure. Thus, the hypothesis is stated as follows:

H3: Company size influences carbon emission disclosure

The Influence of Environmental Performance on Carbon Emission Disclosure

Environmental performance is related to company's concern about the environment. In Indonesia, for example, environmental disclosure is voluntary and it is a must for the company to focus on the environment considering the impacts caused by their activities on the environment. Today, the society pays great attention to environmental performance and always demands company to be more sensitive to environmental issues (Majid and Ghozali, 2015). Based on the legitimacy theory, the company with good environmental performance will do environmental disclosure since it can also improve their image in the society. The company with good environmental performance has bigger tendency to do environmental disclosure than company with poor environmental performance. This can be proved by Prafitri and Zulaikha (2016) who found that hat environmental performance positively influences carbon emission disclosure. Therefore, the hypotheis can be stated as follows:

H4: Environmental performance influences carbon emission disclosure

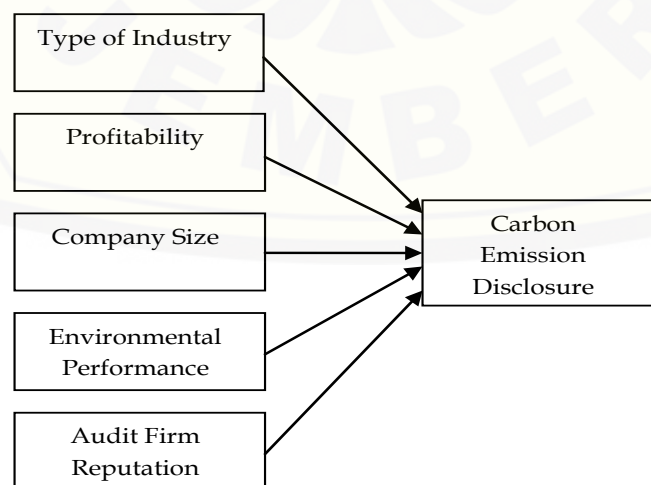


Figure 1
Conceptual Framework

The Influence of Audit Firm Reputation on Carbon Emission Disclosure

The size of quality public accountant office will result in their image and trust inherent in an auditor in public perspective. The auditor with big size, for example Big Four, has better auditing capability, has better access to technology system and has staff specialists than Non Big Four audit firm. Company will choose audit firm with better quality in audit to improve the quality of a financial statement (Irwhantoko & Basuki, 2016).

Based on legitimation theory, the auditor's reputation is considered the achievement and public trust on in him as a good name. Therefore an auditor must be responsible for providing 'news' in the form of useful information in decision making. The research conducted by Craswell and Taylor (1992) found that company audited by Big Four audit firm tends to have a broader disclosure and provide more information to their users. Wardhani (2019) also found that audit firm reputation has a significant and positive influence on carbon emission disclosure. Therefore, the hypothesis can be stated as follows:

H5: Audit firm reputation influences carbon emission disclosure

3. RESEARCH METHOD

Sample Classification

The research population consists of manufacturing companies listed on the Indonesia Stock Exchange (IDX) in the period of 2016 - 2019. The sample was taken using a purposive sampling technique. It is based on some criteria, namely 1) Manufacturing Companies listed on the Indonesia Stock Exchange in the period 2016-2018; 2) Companies not performing delisting from 2016-2018; and 3) Companies disclosing information of carbon emission or greenhouse gas emission in their annual report and/or sustainability report. Based on the criteria, 73 companies were 290 firm-year observations were obtained.

Research Data

This study used secondary data in the form of financial statement, annual report, and sustainability report of the companies listed on the Indonesia Stock Exchange (IDX) from 2016-2019 and PROPER assessment. The data were obtained from the official website of the Indonesia Stock Exchange (www.idx.co.id) and the official website of the Ministry of Environment (www.menlhk.go.id).

The data were collected using documentation method. The documentation method was employed by collecting and summarizing data related to the research, such as tracing variables in company's annual report and/or sustainability reporting in the period of 2016-2019. This research also employed content analysis method to measure and study the data of carbon emission disclosure in company's annual report and/or sustainability report. This method served to measure the amount of carbon emission disclosure by coding the information presented in the annual report and/or sustainability report.

Definition of Operational Variable

This research contains two types of variables, namely independent and dependent variable. The dependent variable in this research is carbon emission disclosure variable (Y). The independent variable in this research consists of type industry, profitability, company size, environmental performance and audit firm reputation. Below is the explanation in Table 1 on the definition of each operational variable.

Data Analysis Method

Descriptive Statistics

Descriptive statistics provides an over view of variables used in a research and presents them in the form of mean, deviation standard, maximum, and minimum.

Multiple Linear Regression Analysis

This research employed a multiple linear regression analysis. This research employed Ordinary Least Square (OLS) since the data were in the form of panel data. The research's hypotheses were tested using t test. The research employed multiple linear regression models. The regression equation in the research is as follows:

$$CE_Disc = \alpha + \beta_1 TIPE + \beta_2 ROA + \beta_3 SIZE + \beta_4 PROPER + \beta_5 AUD + \varepsilon$$

Where α is the constant; β_1, \dots, β_5 is regression coefficient; CE_Disc is carbon emission disclosure; TIPE is type of industry; ROA is profitability; SIZE is company size; PROPER is environmental performance; AUD is audit firm reputation; and ε is error.

4. DATA ANALYSIS AND DISCUSSION

Result of Descriptive Statistical Analysis

The descriptive statistic of variable used in the research is shown in Table 2.

Table 2, above shows the summary of the research data statistic from 2016-2019.

Profitability (ROA) in has the mean value of 5.35, with the standard deviation value of 1.607. Comparison between the mean value and the standard deviation value produces homogeneous data, where the mean value is higher than the standard deviation value. The result of this comparisons shows that profitability (ROA) has a low deviation rate, where the smaller the standard deviation value, the smaller the variation in research data. The mean value of profitability indicates that the sample companies are averagely capable of generating net profit after tax of Rp5.35 for each Rp100 asset owned.

Based on Table 2, company size has the mean value of 28.79, with the standard deviation value of 1.723. Comparison between the mean value and the standard deviation value produces homogeneous data, where the mean value is higher than the standard deviation value. The result of this comparisons

shows that company size has a low deviation rate, where the smaller the standard deviation value, the smaller the variation in research data. The mean value of company size also indicates that the sample companies are relatively big companies.

Based on Table 2, environmental performance variable shows a mean of 3.04, showing that the companies are averagely on the Blue Zone, in which the companies focus on B3 waste management issue. Carbon emission disclosure variable shows a mean of 7.84, indicating that the sample companies averagely disclose 1 item of assessment out of 18 items of CED checklist (Choi et al., 2013).

The type of industry shows that 59 percent of the sample companies are of the industrial group which intensively produces carbon dioxide. The audit firm reputation variable shows that 44 percent of the sample companies use Big Four audit firm.

Table 1
Definition of Operational Variable

No.	Variable	Definition	Measurement	Scale
1	Carbon Emission Disclosure	Company's awareness in handling environmental issues because of carbon emission.	Using Carbon Emission Disclosure Checklist (Choi, 2013) Formula: $CED = (\sum di / M) \times 100\%$ CED = carbon emission disclosure $\sum di$ = total items of carbon emission disclosed M = total item disclosure	Ratio
2	Type of Industry	Category of company with main activity which may generate carbon dioxide intensively such as energy, material, industrial, and utility. Customer policy, customer basic needs, health, finance, information technology, communication, and real estate are non-intensive carbon industrial category	Using dummy variable, where industry included in intensive group is scored 1 and non-intensive industry is scored 0	Nominal
3	Profitability	Company's capability to generate profit	Total net profit after tax divided by Total Asset	Ratio
4	Company Size	Characteristics showing company's financial power	Logarithm of nominal value of company's total asset	Ratio
5	Environmental Performance	Company's performance in creating good environment.	According to PROPER classification. There are 5 types of colors: in which gold scores 5 (excellent), green scores 4 (very good), blue scores 3 (good), red scores 2 (bad) and black scores 1 (very bad).	Interval
6	Audit Firm Reputation	Provision of professional service in audit practice	Big Four audit firm scores 1 and non-Big Four audit firm scores 0	Nominal

Source: processed data

Result of Classical Assumption Test

The classical assumption test conducted in our study consists of normality test, multicollinearity test, autocorrelation test, and Heteroscedasticity test. From the entire classic assumption test, this study can summarize as follows:

- a. The normality test using P-Plot graph shows that the points follow and approach the diagonal line. This indicates that there is normality in the regression model, so that the regression model is feasible to be used for research.
- b. The multicollinearity test shows that the tolerance value of all variables is greater than 0.10 and has a VIF value below 10. This indicates that there is no multicollinearity between the independent and control variables in the regression model.
- c. The Heteroscedasticity test using the White test shows that the lowest probability (Chi-square) value of 0,5, bigger than critical value ($\alpha=0,05$). This indicates that the models do not have Heteroscedasticity problems.

Result of Multiple Regression Analysis

Equation obtained from the result of multiple regression analysis is:

$$CE_Disc=0,159+1,830TIPE+0,055ROA+0,319SIZE-0,194PROPER+0,413AUD + \epsilon$$

The coefficient of determination Text (R^2) shows that the Adjusted R Square value of the regression equation of the research is 0.132. The value shows that all of the research's independent variables contribute 13.2 percent to carbon emission disclosure, while the remaining 86.8 is from other variables out of the research model.

The t-Test Result

Based on Table 3, the t-test shows that the type of industry (TIPE), profitability (ROA) and company size (SIZE) positively influence carbon emission disclosure. This is shown from the significance value of each variable that is lower than 0.05. This research result supports hypotheses 1, 2 and 3. On the contrary, environmental performance (PROPER) and audit firm reputation (AUD) have significance value higher than 0.05. Thus, the research result rejects hypotheses 4 and 5. This shows that environmental performance and audit firm reputation do not influence carbon emission disclosure.

Table 2
Result of Descriptive Statistical Analysis

Variables	Minimum	Maximum	Mean	Deviation Standard
Profitability (ROA)	-60,60	92,10	5,35	1,607
Company Size (SIZE)	21,46	32,48	28,79	1,723
Environmental Performance (PROPER)	0	4	3,04	0,584
Carbon Emission Disclosure (CE_Disc)	5,60	16,60	7,84	3,035

Source: processed data

Table 3
Result of Multiple Linear Analysis

Variables	Coefficient	T	Sig.	Result
Constant	-2,313	-	-	-
Type of Industry (TIPE)	1,830	5,086	0,000	Significant
Profitability (ROA)	0,055	3,453	0,001	Significant
Company Size (SIZE)	0,319	3,036	0,003	Significant
Environmental Performance (PROPER)	-0,194	-0,664	0,507	Not significant
Audit Firm Reputation (AUD)	0,413	1,112	0,267	Not significant

Adj. R-square = 0,132

Sign. F-test = 0,000

Source: processed data

Discussion

Type of Industry on Carbon Emission Disclosure

The result of t-test on the first hypothesis shows that type of industry positively influences carbon emission disclosure. It means the more intensive a company produces carbon, the wider its carbon emission disclosure is. This is based on the legitimacy theory implying that the more intensively a company produces carbon, it will face stricter supervision by the government than on- carbon-intensive company. A company which operates in industry which intensively produces carbon causes bigger impact on the environment and voluntarily does disclosure compared to the company which does not produce carbon intensively or poses small impact on the environment.

There are some companies operating in energy, material, industrial, consumer policy, consumer basic needs, health, financial, information technology, communication, utility and real estate sectors. These companies have big responsibility for the impact of their activities on the environment. Industry which produces intensive carbon will get a strict attention from the government. In addition, the companies operating in industry which produces abundant carbon will do voluntary disclosure for exposing their operation activities. In this case, carbon emission disclosure is part of environmental disclosure which may be used by company in response to the pressure, thus company's activities will be legitimized by the society. This research is intended to confirm the previous restudies conducted by Jannah and Muid (2014) and Prafitri and Zulaikha (2016) proving that the type of industry positively and significantly influences carbon emission disclosure.

Profitability on Carbon Emission Disclosure

The result of t-test for the second hypothesis shows that profitability positively influences Emission Disclosure, indicating that the higher the company's profitability, the wider the carbon emission disclosure the company makes. Hadi (2011) stated that company benefits greatly from utilization of resources, while the society assumes the negative externalities, both directly and indirectly. Therefore, company must be responsible for the negative impacts caused. Company must return some profit obtained for public welfare; remedy of damage caused, and gives reciprocal

value to the stakeholders. Therefore, company must make action in the form of environmental disclosure.

High profitability indicates high operational activities in the form of production and selling activities. The high industrial activities cause high carbon emission. This makes profitability the indicator of the intensity of carbon emission produced. With the high profitability, the public will expect that the carbon emission produced is also high. To reduce the pressure, the company may disclose the actual carbon emission by it. The disclosure will reduce public pressure on the company and may maintain the company's value in the capital market. Jannah and Muid (2014), Majid and Ghozali (2015), Hermawan et al. (2018) and Suhardi and Purwanto (2015) provided evidence that profitability influences carbon emission disclosure.

Company Size on Carbon Emission Disclosure

The result of t-test for the third hypothesis shows that company size positively influences carbon emission disclosure, indicating that the bigger the company size, the wider its carbon emission disclosure is. The legitimacy theory states that a company with big operation process will get bigger pressure and attention from the public than small company and may pay attention to environmental issues better, and the carbon emission disclosure is the company's response to the public pressure and demand for its operation activities to be acknowledged by the public. Bigger companies will get bigger pressure and demand from various parties to make carbon emission disclosure than small companies. A bigger company will have its operation activities comparable to its contribution to surrounding environment, thus it will be easier for external party or the public to pose pressure and demand regarding the economic or political aspect on the company to focus more and pay more attention to environmental issues.

This research employed the amount of assets as the instrument to measure company size. Assets owned by manufacturing companies are usually in the form of machines, tools, vehicles and others which may support their operational process in gaining profit. The assets contribute to carbon emission. Stakeholders may assume that the bigger the assets owned by a company, the more the carbon emission it produces. This view needs an explanation so that it will not lead

to pressure on a company. Company needs to make a disclosure to explain that the quantity of assets owned does not necessarily cause higher carbon emission. This research result conforms to the result of researches conducted by Jannah and Muid (2014), Majid and Ghazali (2015), Hermawan et al. (2018) and Suhardi and Purwanto (2015).

Environmental Performance on Carbon Emission Disclosure

The result of t-test for the fourth hypothesis shows that environmental performance does not influence carbon emission disclosure. This is based on the fact that carbon emission disclosure by the sample companies which follow the criteria of PROPER assessment by the Ministry of Environment and Forestry is not disclosed much in their annual report. In this research, most of the companies are classified into blue (score 3) with only water pollution aspect with the following indicators: 1) company having waste water disposal permission, 2) company taking sample and analysis on waste water at least once a month, 3) company reporting on its waste water monitoring result, 4) company having well-functioning water debit measuring tool, 5) company having performed daily waste water debit measurement, 6) waste water concentration meeting BMAL or requirements specified in permit, and 7) load based quality of waste water meeting BMAL or requirements specified in permit.

Meanwhile, in the PROPER assessment criteria, the air pollution aspect is classified into green (score 4) and gold (score 5), with green (score 4) having air emission indicator <50% BME (Emission Quality Book) and gold (score 5) having air emission indicator <5% BME. The more the company's role in environmental activity, the more it must disclose the environmental performance it has made in annual report. This reflects the company's transparency that it also has interest in and is responsible for what it has done, thus the public will also be aware of the extent of its responsibility for and contribution to the environment. On the contrary, however, company's role in environmental activity in effort to reduce emission is not performed much, thus not many are disclosed by company of its environmental performance in its annual report. This research result conforms to the previous researches conducted by Jannah and

Muid (2014), Majid and Ghazali (2015), and Suhardi and Purwanto (2015).

Audit Firm Reputation on Carbon Emission Disclosure

The result of t-test for the fifth hypothesis shows that audit firm reputation does not influence carbon emission disclosure, which means that audit firm reputation does not influence the extent a company performs carbon emission disclosure. This research result conforms to the result of research conducted by Irwhantoko and Basuki (2016). External auditor serves to give opinion related to the fairness of financial statement presented by company. Disclosure related to carbon emission is mostly made in annual report, corporate social responsibility report or sustainability report. Auditor does not assess the fairness of the reports. Auditor also does not perform "monitoring" related to how environment related disclosure the company makes. External auditor only audits financial statement or ensures that the company makes environment related disclosure, particularly regarding carbon emission.

The reputation of party that makes assurance on the sustainability report may become on factor which influences carbon emission disclosure. The process of assurance on sustainability report is a process to convince the stakeholders related to the information presented in sustainability report. Sustainability report of which arrangement is based on the GRI Standards may serve as the source of information of a company's carbon emission. Assurer of sustainability report may be a certifying agency, subject expert, boutique organization, or auditing firm.

5. CONCLUSION, IMPLICATION, SUGGESTION AND LIMITATION

Conclusion

This research aims at testing whether the type of industry, profitability, company size, environmental performance and audit firm reputation influence carbon emission disclosure. This study used the sample of manufacturing companies listed on the Indonesia Stock Exchange. The observation period was from 2016 to 2019.

Based on the result and discussion, it can be concluded that this research provides evidence that the type of industry, profitability and company size positively influence carbon emission disclosure. This research also provides

some findings. First, this research shows that the bigger the company size, the wider the company's carbon emission disclosure is. Second, the more a company is included in a group of industry with intensive activity producing carbon dioxide, the wider its carbon emission disclosure is. Third, this research also shows that the higher a company's profitability, the wider its carbon emission disclosure is. However, this research is not capable of finding the influence of environmental performance and audit firm reputation on carbon emission disclosure.

Research Implication

This research presents evidence that factors influencing the extensiveness of a company to make carbon emission disclosure are those related to company's operational activities, as shown with the 3 factors evidently influencing carbon emission disclosure. These three factors are closely related to company's operational characteristics. The two factors that do not directly influence carbon emission disclosure are audit firm reputation and environmental performance; indeed do not directly reflect company's operational activities.

In addition, this research also provides evidence that carbon emission disclosure is the company's effort to legitimize its existence in the public and stakeholders' perspective as the party whose operational activities are related to carbon emission. Through carbon emission disclosure, the company attempts to ensure that its operation activities remain within the public value and norm limitation. This research provides additional empirical evidence of the legitimacy theory, which influences a company to do carbon emission disclosure.

Limitation and Suggestion

This research has some limitations and suggestions for further research. First, audit firm reputation used in this research is less relevant to carbon emission disclosure, since audit firm, in this case auditor, serves more to test the fairness of financial statement. Auditor did not test the validity of non-financial information like carbon emission disclosure. Therefore, further research can use assurance report, sustainability report or assurer's reputation to see what or who serves to motivate or encourage company to do carbon emission disclosure. Second, this research uses Carbon Emission Index issued in 2009 as

the measurement instrument which does not confirm yet to the items of carbon emission disclosure GRI G4 and GRI Standards. Yet, the sample company consists of GRI G4 and GRI Standards as the standard of carbon emission disclosure. The carbon emission measurement should use the latest existing standard of carbon emission disclosure in GRI Standards (GRI 305-Emission 2016). Third, the R² value of the research is quite low, which is below 20 percent, indicating that the independent variables used in the research model do not contribute much to carbon emission disclosure. Further research should add factors which reflect company's operational activities, such as company's growth, liquidity, company's life, corporate governance, and so on.

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