

## THE ANALYSIS OF CONTRIBUTING FACTORS OF CARBON EMISSION DISCLOSURE (RESEARCH AT MANUFACTURING COMPANIES LISTED IN INDONESIA STOCK EXCHANGE FROM 2017-2018)

Wiwiek Mardawiyah Daryanto  
Christine Yezzie  
Faradita Kurnia Maharani

### ABSTRACT

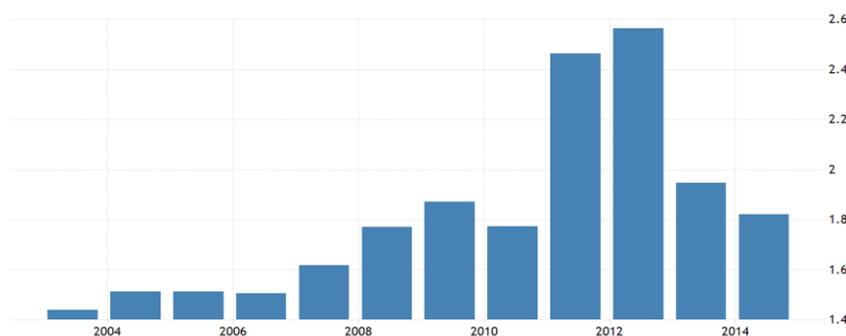
Climate change, or particularly global warming, has become a global phenomenon in this past decade. This environmental issue is affecting most countries around the world. Based on presidential Decree 61 Year 2011 regarding National Action Plan to Reduce Carbon Emissions, a business entity should contribute to environmental changes through the submission of Carbon Emission Disclosure. This research aimed to gather empirical evidence of profitability and the firm's size to Carbon Emission Disclosure. It is conducted by using checklists which are adopted and developed based on the information from the request sheets and questionnaires provided by the Carbon Disclosure Project (CDP). The populations for this research were all Manufacturing Companies from 3 sectors (Basic Industry and Chemicals, Miscellaneous Industry and Consumer Goods Industry) listed in the Indonesian Stock Exchange or IDX at the period of 2017 - 2018. In order to get the sample of this research, we used a purposive sampling method by choosing Manufacturing companies that publish annual reports and sustainability reports which also disclose the firm's carbon emission during the observation period. The data collection used, was the secondary data obtained from Indonesia Stock Exchange. Meanwhile data analysis conducted by using multiple linear regression analysis.

**Keywords:** Annual Report, Carbon Accounting, Carbon Emission Disclosure, Firm Size, Profitability.

### 1. INTRODUCTION

Global warming is a major problem that needs to be addressed by the entire world, in an effort to improve the earth that must be preserved. One of the biggest concerns toward global warming is the emission of greenhouse gas. According to the data from REDD (Reduction Emissions from Deforestation and Forest Degradation) in the year of 2005 Indonesia has 2,05 gigatons of greenhouse gas emissions. Based on this fact, Indonesia placed in the third position as the World Largest Carbon Emission Contributors, after the United States of America (5,95 gigatons) and China (5,06 gigatons). And this amount is predicted to be increased up to 3 gigatons by the end of 2020. The Ministry of Indonesian Energy and Mineral Resource announced in 2012 that a huge number of carbon emissions are mostly produced by the mining and agricultural industries. The sector of the mining industry such as oil, gas, coal is the biggest contributor to the number of carbon emissions in all developing countries listed, including Indonesia. The other biggest contributor to high carbon emission rate is the agricultural industry. In 2000 the growth of carbon levels created by the agricultural industry increased by 54%.

**Figure 1 Indonesia's Carbon Emission.**



Source: World Development Indicators – data.worldbank.org

To prevent greater economic losses because of the environmental damages caused by economic activities the United Nations Framework Convention on Climate Change (UNFCCC) created an international amendment known as The Kyoto Protocol in 1997. In Indonesia, The Kyoto Protocol was ratified for the first time on June 28<sup>th</sup> 2004 through *Undang-Undang No. 17 of 2014*, written that Indonesia as a developing country at that time is not obligated to reduce emissions in such developed countries. But participation is highly needed to achieve UNFCCC's goals.

Otherwise, the implication of The Kyoto Protocol gives rise to carbon accounting. Carbon accounting is the obligation of an organization to record, measure, and report their disclosure amount of carbon emission they had in the annual period of report. Furthermore, while doing the carbon accounting other beneficial information related to the efficiency of carbon emission in use of raw materials, labor cost, and factory overhead cost will be reported more clearly. But, in Indonesia the practical use of carbon accounting is still voluntary disclosure with the reference of the World Business Council for Sustainable Development / World Resources Institute (WBCSD-WRI) and the standard which created by United Nation Environment Pregame (UNEP). The decision of President Susilo Bambang Yudhoyono at the Pittsburgh G-20 Meeting in 2009, representing the country of Indonesia together with participating countries in efforts to reduce greenhouse gas emissions to meet the target by 2020. There are only 100 companies listed on the Australian Stock Exchange, while in this study sample are manufacturing companies on the Indonesia Stock Exchange (IDX), (Choi, et al. 2013). As for the research period, previous research was made by 2006 – 2008 for Choi, et al (2013). Meanwhile, this report itself focuses on the sustainability report from 2017 until 2018. Another difference can be seen in their independent variable factors of each research.

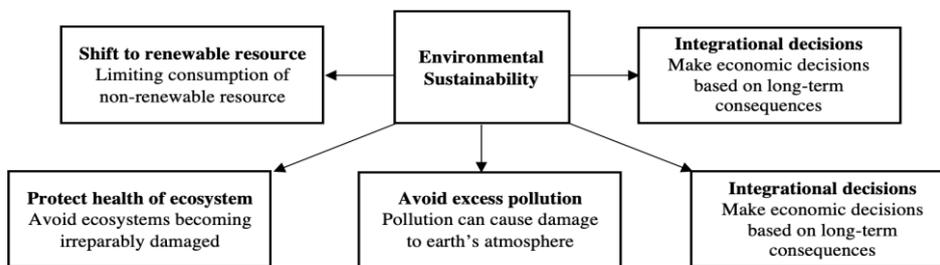
## 2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

### Environmental Sustainability

Environmental Sustainability is a concern of the ability to continue a certain behavior with whether environmental resources would be protected and maintained for the next generations. Herman Daly the experts in ecological sustainability in 1990 proposed sustainable for:

1. Resources are regenerate, but do not exceed harvest rates.
2. Pollution that cannot exceed the environmentally friendly capacity.
3. Updated resources must be completed and replacements are completed.

Figure 2. Environmental Sustainability Impact.



### Carbon Accounting

Carbon accounting is a set of process in calculating and reporting the amount of carbon dioxide (CO<sub>2</sub>) released for industrial processes, setting revenue targets, establishing systems and programs to reduce the emissions, and reporting them all (Louis et al, 2010). Corporate Social Responsibility (CSR) on company accounting disclosures need to be announced. By making calculations toward the carbon disclosure, the company can find out the level of carbon emission produced from the measurement results and report it to the stakeholders. The main purpose of implementing carbon accounting is to reduce carbon emissions produced by industry as part of an agreement in the Kyoto Protocol. Below is the checklist of Carbon Emission Disclosure created by the CDP:

Table 1. Checklist Carbon Emission Disclosure.

Category	Items	Notes
1. Climate Change (CC): Risks and Opportunities	CC1	Explanation where companies handle the management risk during climate change.
	CC2	Explanation where the company resolves the problem when the changes in the future.
2. Greenhouse Gases (GHG): Accounting for Greenhouse Gas Emissions	GHG1	Describe the methods utilized in calculating greenhouse gas (GHG) emissions.
	GHG2	Following up on external reporting on greenhouse gas emissions.
	GHG3	Total co2 gas produced.
	GHG4	Descriptions of step 1 to 3 concerning greenhouse gas emissions.
	GHG5	A description of the sources of greenhouse gas emissions. (e.g., electricity, coal).
	GHG6	An explanation of the sources of greenhouse from the segmentation side.

	GHG7	Comparison from year to year.
3. Energy Consumption (EC)	EC1	Total energy devoured.
	EC2	Energy used but can be recycled.
	EC3	A detailed description of all the criteria.
4. Reduction and Cost (RC)	RC1	Efforts to reduce greenhouse gas emissions.
	RC2	Details in the target of reducing greenhouse gas emissions.
	RC3	Costs required in the effort.
	RC4	Estimated emission costs for the future.
5. Accountability of Cost and Carbon Emission (ACC)	ACC1	The council's responsibility in solving emissions management problems related to greenhouse gas emissions.
	ACC2	Council decision on the issue of greenhouse gas emissions.

Source: Choi et al (2013)

The benefits of carbon accounting disclosure through annual reporting, stakeholders will assess the company's participation in decreasing the carbon pollution. For the company itself, the establishment of accounting carbon disclosure will provide a positive sight view for stakeholders, which in turn will bring the company economic benefits. For the Indonesian government, carbon accounting can encourage cooperation with developed countries related to Reducing Emissions from Deforestation & forest Degradation (REDD).

### Legitimacy Theory

Legitimacy theory can be regarded as equating perceptions or assumptions that actions taken by an entity are actions that are desirable, in accordance with norms developed in the social. (Suchman, 1995 in Kirana, 2009). Legitimacy theory concentrates on the concept of a social contract, implying that a company's survival is dependent on the extent to which the company operates within the bounds and norms of society (Brown and Deegan, 1998). Legitimacy is considered important for the company because people's legitimacy to the company is a strategic factor for the company's future development. Legitimacy theory urge the companies to assure that all of the activities and performance the companies did are acceptable according to the belief of the society. The companies' legitimacy could face threats if they fail to show compliance with the demands of the society. Company disclosed the number of emissions of carbon through the yearly (annual) sustainability report to describe and break down the impression of environmental responsibility, so that the company will get acceptance from the community. In legitimizing its actions via disclosure, the corporation hopes ultimately to justify its continued existence (Guthrie and Parker, 1989).

### Stakeholders Theory

Stakeholders and organizations influenced each other in many ways. From a rather business-driven perspective, stakeholder theory interest lies in three premises "organizations have stakeholder groups that affect and are affected by them; these interactions impact on specific stakeholders and the organization; and perspectives of salient stakeholders affect the viability of strategic options" (Haberberg and Rieple, 2001). Social relations that can be seen from the responsibilities and accountability. Stakeholders have an ability to control the organization's activities including the disclosure of emission. Based on Ghomi and Leung (2013), every stakeholder has different expectations toward the company. The role of leaders in organizations is acknowledged as very important in ethical issues, especially because of their key influence on the organizational culture (Hitt, 1990). To pursue these expectations, stakeholders can give pressure to the company directly or indirectly in establishing the environmental disclosure. Therefore, based on stakeholder theory as a company, there would be an obligation to provide benefits to all their stakeholders.

### Profitability

Profitability is often used in terms of calculating the environmental responsibility. Profitability has a purpose as a measure of a company's financial performance. In profitability, financial performance could be measured by using some ratios, such as ROI (Return on Investment), ROE (Return on Equity), and the ratio used for disclosing carbon emission measurement in this research; ROA (Return on Asset). ROA is a ratio that compares income with total assets. The greater the ratio, the greater is the company's ability to earn revenue through its assets.

In regard to the theory of legitimacy, community constantly embed pressure on companies to give concern and full attention toward environmental problems especially to the top leading company. Companies with huge number of profitability are easier to react toward this pressure compared to the small one, because those companies require a lot of resources in environmental disclosure (Barako, et al in Zhang, et al 2013. So, the hypothesis can be concluded as follows:

*H<sub>1</sub>: Company's profitability (ROA) has positive influence on carbon emission disclosure.*

**Firm Size**

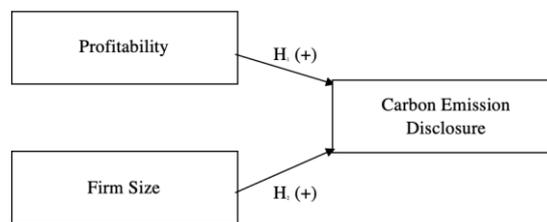
The larger the company will get greater social pressure in establishing voluntary environmental disclosures (Choi, et al 2013). The larger company, the more active is their operational activities and the bigger their contribution to the surrounding environment. The society community will put pressure on the company when there are company activities that directly impact the environment not in accordance with established norms. In response to community pressure, companies make disclosures related to their performance. Thus, the bigger the company, the possibility of disclosing information about environment would be greater, and vice versa. This statement is validated by the findings of Freedman and Jaggi (2005) on their research, stating that the greenhouse pollution disclosure is positively related to firm size. Based on the description above, the hypothesis can be formulated as follows.

*H<sub>2</sub>: Firm's size has positive influence on the carbon emission disclosure.*

**Framework**

Here is the framework of the research:

**Figure 3. Research Framework**



Source: *Data processed, 2020*

The frameworks show that this journal wants to prove a hypothesis regarding the influence of profitability and firm size toward the Carbon Emission Disclosure.

**Previous Research**

**Table 3. Previous Research**

No	Researcher	Variable	Description	Findings, summary
1.	Irwhantoko (2016)	Dependent: Carbon Emission Disclosure Independent: - Firm size - Profitability - Competency - Growth - Accountant Public	Tool: - Classic assumption test - Normality test - Multicollinearity test - Test heteroscedasticity - Autocorrelation test - Multiple regression - Adjusted R Square - T-test	Which produced a significant difference in this study, and there are several factors that have no influence on the dependent variable.
2.	- Robby Priyambada - Suhardi (2015)	Dependent: Carbon Emission Disclosure Independent: - Industry type - Firm size - Profitability - Leverage - Environmental performance	Tools: - Multiple regression	The industry type, company size, profitability variable have a significant positive influence toward carbon emission disclosure. Which does not occur significant differences in these variables.
3.	-Rizqi Abdul Majid -Imam Ghozali (2015)	Dependent: Carbon Emission Disclosure Independent: - PROPER classification by <i>Kementerian Lingkungan Hidup</i> . - Firm size - Profitability - Leverage - Media	Tools: Regression through Ordinary Least Square (OLS)	The independent variable has no influence on the dependent variable. While company size, profitability, and the media spotlight have significant positive effect on greenhouse gas emissions disclosure.

Source : *Data processed, 2020*

### 3. RESEARCH METHODOLOGY

#### Population and Sample

In this study using manufacturing companies that are listed on IDX as a population in the year of 2017 and 2018. There are several reasons the writer choose to do a research on manufacturing sectors; 1) Manufacturing companies have a high sensitivity and influence on the community and the surroundings environment; 2) For equality in financial statements because each financial statement or account classification in each sector there is a different presentation; 3) There are differences in disclosure items in each sector (Purnamawati et al. 2017).

The collect sample companies of this study the researchers getting samples with certain criteria (purposive sampling method). The criteria to determine the sample that was used are:

1. Manufacturing companies listed on the IDX.
2. Listed Companies that publish sustainability reports in 2017-2018.  
Companies that are explicitly or implicitly registered (and attached how to handle it).

The duration of the research is from 2017 and 2018. Multiple Regression analysis is used to determine how much independent variables influence the dependent variable. This study is conducted by using regression equation as follows:

$$CE\_Disc = \alpha + \beta_1Pro + \beta_2Size + e$$

CE\_Disc = Carbon Emission Disclosure  
 $\alpha$  = Constanta  
 $\beta_1 - \beta_2$  = Regression Coefficient  
 Pro = Profitability  
 Size = The size of the company  
 e = error

#### Operational Definition of the Variables

Table 4. Variable Description

Variable Name	Variable Description	Researcher
X1 (Firm Size)	Natural Logarithm (Ln) of total assets	+ Freedman and Jaggi (2005), Stanny and Ely (2008), Prado-Lorenzo et al (2009), Luo et al (2010), Tang and Luo (2011), Gallego-Alvarez (2010), Borghei-Ghomi and Leung (2013), Choi et al (2013), D'Amico et al (2014), Jannah and Muis (2014) - 0
X2 (ROA)	Return to total assets; Earnings before interest, taxes and depreciation (EBIT) over book value of total assets and Earning Per Share (EPS) : Net income over outstanding (of firm in certain period of time)	+ Jannah and Muid (2014) - 0 Cormier and Magnan (2003), Freedman and Jaggi (2005), Stanny and Ely (2008), Prado-Lorenzi et al (2009), Tand and Luo (2011), Gallego-Alvarez (2010),Choi et al (2013), Luo et al (2013)
Y (Carbon Emission Disclosure)	By disclosing Sustainability Report to measure and disclose the activity of the Firm, as a responsibility for the Stakeholders  <b>SRDI = V / M</b>  Note: SRDI = Sustainability Report Disclosure Index of the Company V = Number of items disclose by the Company M = Number of items expected (91 item)	Dian, 2015

Source : Data processed, 2020

#### Descriptive Analysis

The independent variable in this study is Return on Assets and business measurement, while the Dependent Variable is Disclosure Carbon Emission Disclosure.

- + Significant Positive Effect
- Significant Negative Effect
- 0 Does not affect significant

#### 4. RESULTS AND DISCUSSIONS

##### Description of the Research's Sample

Table 5. Details of Sample Result

No	Procedure of the Sample Determination	Number
1.	Total number of Manufacturing Company that published <i>Annual Report</i> and <i>Sustainability Report</i> during the year 2017-2018	
	a. Year 2017	141
	b. Year 2018	141
2.	Total number of Manufacturing Company that do not disclose carbon emission of greenhouse gas information on <i>Annual Report</i> or <i>Sustainability Report</i>	(126)
Total of Sample Used		<b>15</b>

Source: *Data processed, 2020*

Based on the data collected using the purposive sampling method, we obtain 15 data of Manufacturing Companies that could be used in this research. Further on, those samples will be used to analyze and test the hypotheses.

##### Variable Description

The results of the descriptive statistical test research are as follows:

Table 6. Descriptive Statistics

Variable	N	Minimum	Maximum	Average	Standard Deviation
Carbon Emission Disclosure	15	-1,91	47,52	10,6787	14,85747
Firm Size	15	21,51	28,59	24,2647	1,97487
Profitability (ROA)	15	4,50	18,00	10,2000	3,43719

Source: *Data processed, 2020*

Based on the calculations on the table above, N or the total sample of each variable is 15 during the period of 2017 - 2018. Dependent variable in this research is Carbon Emission Disclosure which is measured by using a checklist by CDP. The least score is -1,91, and the highest score is 47,52.

Profitability variable is an independent variable used to measure Manufacturing Company using *Return on Assets*, which is total net profit divided by total assets. The least score for profitability (ROA) is 4,50, while the highest score is 18,00.

Firm Size variable is an independent variable used to measure the size by total assets owned by of the sampled Manufacturing Company. The least score for Firm Size is 21,51, while the highest score is 28,59. Average score for this variable is 24,2647.

##### Validity and Reliability Test

A reliability test is a set of measurements or measuring devices that have consistency when repeated measurements. A variable is said to be reliable if the Cronbach alpha value is  $\geq 0,50$

	Cronbach's Alpha	N of Items	
X1	0.977	2	Reliable
X2	0.999	2	Reliable
Y	0.783	3	Reliable

Source: *Data processed, 2020*

Based on the table above shows that the reliability test conducted on 15 companies shows that all variables are said to be reliable.

**Classical Assumption Testing**

The first step taken in the classical assumption test is the normality test, as follows:

**Table 7. Normality test**

**One-Sample Kolmogorov-Smirnov Test**

		Unstandardized Residual
N		15
Normal Parameters <sup>a,b</sup>	Mean	.0000000
	Std. Deviation	3.39587856
Most Extreme Differences	Absolute	.182
	Positive	.182
	Negative	-.138
Test Statistic		.182
Asymp. Sig. (2-tailed)		.192 <sup>c</sup>

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.

Source: *Data processed, 2020*

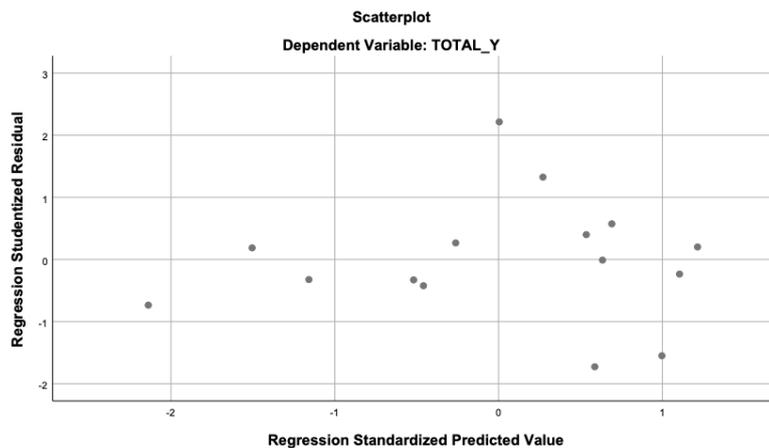
In accordance with the normality test results listed, the data is declared normal and can proceed to the next test.

**Multicollinearity Test**

The purpose of the multicollinearity test is to find out whether the data collected occurs because it can or not. Sometimes it doesn't happen when approved by  $VIF < 0.10$ . And shows that the results of data processing does not occur between the independent variable and the dependent variable.

**Heteroscedasticity Test**

**Figure 4. Scatterplot**



Source: *Data processed, 2020*

Seen from the data above, the distribution of points is even and does not form patterns. In the scatterplot chart shown below, there are heteroscedasticity symptom.

## Discussions of the Research Result

Before doing the hypothesis test, the classic assumption test is done at first. It includes Multicollinearity test, Autocorrelation test, Heteroscedasticity test, and Normality test. Regression model in this research has met all the classic assumption test criteria, so it could continue the hypothesis test. Hypothesis testis done by testing the equation model partially on each independent variable using multiple linear regression. The result to multiple linear regression test showed below:

**Table 8. Multiple Linear Regression Result**

Model	Coefficients				
	Unstandardized Coefficients		Standardized Coefficients		
	B	StdError	Beta	t	Sig.
(Constant)	17,496	13,559		1,290	0,221
X1 (ROA)	-0,014	0,072	-0,062	-0,198	0,846
X2 (Firm Size)	-0,294	0,544	-0,169	-0,541	0,598

Source : Secondary data processed, 2020

Hypothesis 1:

The variable X1 (ROA) has a  $t_{\text{count}}$  of -0,198 while the  $t_{\text{table}}$  is 2,16037.

$$t_{\text{count}} < t_{\text{table}} \quad (-0,198 < 2,16037)$$

The results of the first hypothesis, the independent variable Return on Assets has significance value  $> 0.05$  concluded with no significant effect on the dependent variable.

Hypothesis 2:

The variable X2 (Firm Size) has a  $t_{\text{count}}$  of -0,541 while a  $t_{\text{table}}$  of 2,16037.

$$t_{\text{count}} < t_{\text{table}} \quad (-0,541 < 2,16037)$$

The results of the second hypothesis, the independent variable Firm Size has significance value  $> 0.05$  concluded with no significant effect on the dependent variable.

**Table 9. Determination of Model 1 and Model 2**

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.155 <sup>a</sup>	.024	-.139	3.66797

a. Predictors: (Constant), TOTAL\_X2, TOTAL\_X1

b. Dependent Variable: TOTAL\_Y

Source: Data processed, 2020

R Square model noted at 2,4%, which explains that the magnitude of the influence exerted by the ROA and Firm Size variables on Carbon Emission Disclosure was 2,4% while the remaining 97,6% was influenced by the other factors which are not examined in this research.

## 4. CONCLUSION AND SUGGESTION

### CONCLUSION

This research conducted to analyze the influence of Profitability (ROA) and Firm Size to Carbon Emission Disclosure. From the data analysis and the goodness of fit test, it could be concluded that:

1. The equation model based on a secondary method collected from 141 Manufacturing Companies that published annual reports in 2017 and 2018 become only 15 Manufacturing Companies that could be processed. The result of multiple regression analysis is adjusted  $R^2$ , and it is considered to be reliable and the data processed has met the classic assumption test criteria.
2. The first hypothesis is rejected, so the profitability (ROA) variable is considered to be insignificant to carbon emission disclosure. From the processed data, it could be concluded the better the ROA of the company the higher the effect on carbon emission disclosure would be.
3. The second hypothesis is rejected, so the firm size variable is considered to be insignificant to carbon emission disclosure. The result of this research shows that the bigger firm size of the company the higher the effect on carbon emission disclosure.
4. Based on this research, other countries could learn the importance in providing more specific information in the sustainability report in order to make the readers recognize the existence of environmental risks and challenges that might face them in the future. The disclosure of carbon emissions for companies is crucial, not only for countries with

many manufacturing industries in it such as Indonesia. disclosure of carbon emissions is important because the resulting pollution impacts are massive and globally.

#### LIMITATION

1. The research on the effect of Carbon Emission Disclosure requires other variables besides ROA and Firm Size.
2. Not all listed Manufacturing Companies established their report toward Carbon Emission Disclosure. And Not all listed Manufacturing Companies published Sustainability Reports in terms of greenhouse Carbon Gas Emissions.
3. Although some companies have done Carbon Emission Disclosure. But these companies still did not make disclosures in accordance with 18 points of carbon emission disclosure.

#### SUGGESTIONS

1. Researchers could add more alternative independent variables such as competition, growth, debt ratios and public accounting firms for the next research regarding Carbon Emission Disclosure.
2. Future studies are expected to be able to combine secondary and primary data processing results to support the completeness of company data.
3. It is expected that all Manufacturing companies listed on IDX will follow the regulation by the government and disclose their carbon emissions through the Sustainability report.
4. Listed Companies that have already disclosed their carbon emissions activities should do it based on 18 elements of disclosure.

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Wiwiek Mardawiyah Daryanto  
Sekolah Tinggi Manajemen IPMI  
Email: [wiwiek.daryanto@ipmi.ac.id](mailto:wiwiek.daryanto@ipmi.ac.id)

Christine Yezzie  
Sekolah Bisnis dan Manajemen, Institut Teknologi Bandung  
Email: [christineyezzie@sbm-itb.ac.id](mailto:christineyezzie@sbm-itb.ac.id)

Faradita Kurnia Maharani  
Sekolah Bisnis dan Manajemen, Institut Teknologi Bandung  
Emal: [faradita\\_maharani@sbm-itb.ac.id](mailto:faradita_maharani@sbm-itb.ac.id)