

# DIGITALES ARCHIV

ZBW – Leibniz-Informationszentrum Wirtschaft  
*ZBW – Leibniz Information Centre for Economics*

Hermawan, Atang; Aisyah, Isye Siti; Gunardi, Ardi et al.

## Article

### Going green : determinants of carbon emission disclosure in manufacturing companies in Indonesia

#### Provided in Cooperation with:

International Journal of Energy Economics and Policy (IJEPP)

*Reference:* Hermawan, Atang/Aisyah, Isye Siti et. al. (2018). Going green : determinants of carbon emission disclosure in manufacturing companies in Indonesia. In: International Journal of Energy Economics and Policy 8 (1), S. 55 - 61.

This Version is available at:  
<http://hdl.handle.net/11159/1916>

#### Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/econis-archiv/>

#### Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.  
<https://zbw.eu/econis-archiv/terms-of-use>

#### Terms of use:

*This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.*



## Going Green: Determinants of Carbon Emission Disclosure in Manufacturing Companies in Indonesia

**Atang Hermawan<sup>1\*</sup>, Isye Siti Aisyah<sup>2</sup>, Ardi Gunardi<sup>3</sup>, Wiratri Yustia Putri<sup>4</sup>**

<sup>1</sup>Universitas Pasundan, Faculty of Economics and Business, Jalan Tamansari No. 6-8, Bandung 40116, Indonesia, <sup>2</sup>Universitas Pasundan, Faculty of Economics and Business, Jalan Tamansari No. 6-8, Bandung 40116, Indonesia, <sup>3</sup>Universitas Pasundan, Faculty of Economics and Business, Jalan Tamansari No. 6-8, Bandung 40116, Indonesia, <sup>4</sup>Universitas Pasundan, Faculty of Economics and Business, Jalan Tamansari No. 6-8, Bandung 40116, Indonesia. \*Email: [atanghermawan@unpas.ac.id](mailto:atanghermawan@unpas.ac.id)

### ABSTRACT

This study aims to gather empirical evidence on the influence of regulators, institutional ownership, firm size, and profitability to carbon emission disclosure. Measurements regarding the area of carbon emissions disclosure are conducted using checklists that are adopted and developed based on the information request sheets provided by the carbon disclosure project. The population of this study are all manufacturing companies listed on the Indonesia stock exchange at the period of 2014–2016. Samples of this study are being chosen by using purposive sampling method; which obtained 22 manufacturing companies, that published their annual financial reports and sustainability reports during the observation period and disclose their carbon emissions. The data used are secondary data from Indonesia stock exchange. The analysis technique used is multiple linear regression analysis. The research results proved that the regulator has an effect on carbon emission disclosure, company size influences carbon emission disclosure, and profitability affects carbon emission disclosure, while institutional ownership does not affect carbon emission disclosure.

**Keywords:** Carbon Emissions Disclosure, Regulator, Institutional Ownership, Company Size, Profitability, Indonesia

**JEL Classifications:** G3, L6, M1, Q5

## 1. INTRODUCTION

Most countries are concerned about global warming and are trying to find ways to reduce greenhouse gases to overcome climate change (Rokhmawati et al., 2017); (Egbunike and Emudainohwo, 2017). Paris climate accord, concluded in 2016, reflects on this concern (Yu and Lee, 2017). Carbon emission disclosure is a part of an entity's contribution to environmental and climate changes, particularly on global warming.

Global warming phenomenon has now become an increasingly important issue in most countries (Liu et al., 2015); (Asmeri et al., 2017). The appeal for companies to mitigate climate change challenges can also be justified. An important aspect of climate change mitigation is the company's obligation to recognize, measure, record, present and disclose their carbon emissions (Kalu et al., 2016); (Rokhmawati and Gunardi, 2017). The study Kalu

et al. (2016) also suggested that carbon disclosure acts as a means of achieving public trust and legitimacy.

Previous researches have examined the disclosure of carbon emissions from various aspects, both in Indonesia and abroad. Many factors affect carbon emissions disclosure. Choi et al. (2013) mentioned influential factors, namely industry type, carbon emission level, firm size, and quality of corporate governance. Borghei-Ghomi and Leung (2013) found that firm size, firm age, and institutional ownership structure affected carbon emissions disclosure.

Study by Kalu et al. (2016) suggested that the economic factors that affected voluntary carbon disclosure in the property sector of a developing country are the size of the firm that determines the resources available to it. Then profitability and liquidity are determined by fund raising and disclosure activities that are easily

accessible. Finally financial slack affected the convenience with which equipment and machinery are replaced to reduce greenhouse gas emissions.

The purpose of this study is to analyze the correlation between determinants of carbon emissions disclosure from manufacturing companies listed on the Indonesia stock exchange. This study also aims to investigate validity probability of the variables that showed conflicting results in the literature, as some researchers have identified a correlation with a positive influence between such relationships, and some other negative relationships. Therefore, it is hoped that the findings of this study contribute to the existing knowledge on the subject and provide evidence for further research.

From several factors affecting carbon emission disclosure, the researcher selects three variables from previous research, namely institutional ownership, firm size, and profitability, and adds a new variable, the regulator to carbon emission disclosure to be a research variable due to the many variations or differences of research results against those variables.

Carbon emission disclosure is an issue that began to develop in various countries related to the impact of climate change on organizational survival, Indonesia is no exception. Carbon emission disclosure of a company can be found in the annual report and sustainability report. Some theories explain the disclosure of carbon emissions that are included in the disclosure of the environment namely the theory of legitimacy and stakeholder theory.

The theory of legitimacy explains that organizations will continually operate within the limits and values received by communities around the company in an attempt to gain legitimacy. Gray et al. (1995) states that an organization or company will continue its existence if the public realizes that the organization operates for a value system that is in line with the community's own value system. Legitimacy theory encourages companies to ensure that their activities and performance are acceptable to the public. With the acceptance of the community, it will add value to the company.

Stakeholders are parties who have an interest in the company that may affect or may be affected by the company's activities. Gray et al. (1995) states that the survival of a company depends on the support of stakeholders and that support should be sought, so that the company's activities should be aligned with that aim. Disclosure of carbon emissions and the environment is part of the communication between the company and its stakeholders. Stakeholder theory is used as a basis for analyzing the groups in which companies should be responsible (Moir, 2001).

### 1.1. Effect of Regulator on Carbon Emission Disclosure

Jones et al. (2017) stated that climate change issues are one of the priorities in sustainable development goals (The SDGs). Climate change action needs special attention so that the goal of SDG can be achieved. Of course, the role of government is needed in the form of policy.

The government, as the regulator, also includes one of the stakeholders who have great authority to pressure the company to be environmentally responsible and disclose carbon emission. Governments that are aware of environmental problems due to corporate activities will have a tendency to pressure companies to be more responsible for the environment.

According to Huang and Kung (2010) regulatory pressure has a significant relationship with environmental disclosure. This is in line with the research by Liu and Anbumozhi (2009) which showed that government attention has an influence on environmental disclosure on Chinese companies. Patten and Trompeter (2003) also indicated that regulatory costs are effectively reduced because companies do environmental disclosures. Pressure from regulators is one of the major factors that keep companies concerned about the environment and carbon disclosure (Peng et al., 2015).

### 1.2. The Effect of Institutional Ownership on Carbon Emission Disclosure

Institutional ownership has important role in monitoring management because with the existence of institutional ownership, it will encourage more optimal supervision. Widyaningsih et al. (2017) stated that monitoring will surely ensure prosperity for shareholders. The influence of institutional ownership as regulatory agents is suppressed through their considerable investment in the capital market so as to impede opportunistic manager behavior.

The greater institutional ownership will improve monitoring of the company, thus revealing all the activities undertaken by the company will improve the positive image to the stakeholders. The disclosure of the environment will increase the value of the company and assist in the company's ongoing development.

Ho and Tower (2011) indicate that the concentration of ownership indicated a consistent positive correlation with voluntary disclosure. Companies with greater foreign and institutional ownership have significant and positive correlation with the level of voluntary disclosure. The similar results were also found by Cotter and Najah (2012), institutional investors positively affected with climate changes disclosure.

Results of the research by Borghei-Ghomi and Leung (2013) discovered that institutional ownership has positive effect on carbon emission disclosure. Company that has a considerably high institutional ownership will be under the pressure of the stakeholders or shareholders. Hence, relevant with the disclosure, company will voluntarily disclose additional reports that are consistent with stakeholder theory.

### 1.3. Effect of Company Size on Carbon Emission Disclosure

The practice of social and environmental performance, and disclosure, require considerable resources in terms of funding and expertise. Large companies are considered to have more resources to cover pollution reduction costs and related costs (Freedman and Jaggi, 2005). This is in line with the study by Kalu et al. (2016) suggested the hypothesis that large firms have more resources to cover the cost of pollution reduction. Therefore, the assumption

is that large companies will reveal more information than smaller companies. The availability of resources is critical to addressing issues related to climate change mitigation, which often require the company to operate significantly. All research on greenhouse gas emission disclosure found significant positive correlations between company size and information disclosure (Rankin et al., 2011); (Berthelot and Robert, 2011).

According to Wang et al. (2013) larger companies are assumed to face greater social and political pressure than small firms, hence they are increasing corporate information disclosure to build a good social image as part of their business strategy. Furthermore, a good social image is used by the company to gain legitimacy from the community where the company is located.

Galani et al. (2012) stated that larger companies have sufficient resources to pay for information production costs (collecting and producing information) for the users of annual reports. Large companies publish more information in their reports to provide relevant information to different users. Larger firms tend to disclose more information from small companies in their annual reports due to their competitive cost advantage. Therefore, firm size has a positive influence on the publication of sustainable information.

According to Luo et al. (2013) that company size has a positive effect on carbon emissions disclosure. Stakeholders have high expectations about carbon management practices. To respond to these pressures, the way in which companies can be pursued is to conduct social disclosure of the environment in order to gain support from stakeholders and gain legitimacy from the community.

#### 1.4. Effect of Profitability on Carbon Emission Disclosure

The study by Kalu et al. (2016) suggested that the advantages of giving companies a pool of resources for environmental mitigation and reporting activities. In addition, carbon disclosure acts as a means to achieve public trust and legitimacy. This disclosure could be a means of achieving public trust and legitimacy in terms of how profits are made, not on environmental costs. The empirical evidence of how greenhouse gas disclosure affects profitability is mixed. According to Brammer and Pavelin (2006) it should be noted that profitability allows managers to gather resources that can be used to absorb environmental reporting costs. Studies argue that profitable companies are more vulnerable to the public, so interested parties may be interested in how companies generate profits (Berthelot and Robert, 2011); (Chithambo, 2013). Thus, profitable companies facing public pressure on how they make profits, can use information disclosure. Such disclosure of environmental information justifies their benefits (Bewley and Li, 2000).

Prado-Lorenzo et al. (2009) found evidence of a significant negative correlation between profitability and disclosure with respect to GHG size of profitability, but no significant relationship with the second profitability indicator. A study conducted by Freedman and Jaggi (2005) reported a non-significant relationship

with profitability. However, other studies have found significant positive correlations (Berthelot and Robert, 2011). The idea seems to be consistent with the profitability from voluntary disclosure as a means of transmitting information to outside investors viewed as a tool to gain a competitive advantage. The idea of this theory is that companies can use voluntary environmental disclosures to signal that their intangible assets will help ensure future income. The rejection of this hypothesis will indicate that financial performance or profitability due to detection of environmental signal connectors will indicate whether it is a positive or negative relationship (Freedman and Jaggi, 1988).

Prado-Lorenzo et al. (2009) stated that the higher the return on assets indicated that financial performance of the company is also better. The higher the financial performance means the company has the financial ability to include a strategy to reduce its carbon emission into its business strategy.

According to Luo et al. (2013) that companies with good financial conditions have financial capability in making environmental decisions. Conversely, companies with poor financial performance focus more on achieving financial goals and improving their performance thus limiting their ability in preventing and reporting carbon emissions. The results found a positive relationship between profitability and carbon emissions disclosure.

Choi et al. (2013) stated that companies with good financial conditions can afford the additional human or financial resources required for voluntary reporting and better disclosure of carbon emissions to withstand external pressures. Firms with high profitability disclose information get a signal that they can act well on environmental pressure effectively and are willing to solve problems quickly (Gunardi et al., 2016).

## 2. METHODS

The scope of the object in this study are limited to the regulator, institutional ownership, company size, profitability, and carbon emission disclosure. The research unit in this study is a manufacturing company listed in Indonesia stock exchange year 2014–2016. The population in this study is 144 companies in the manufacturing industry listed on Indonesia stock exchange in 2014–2016.

Sampling technique used is nonprobability sampling with purposive sampling method. The reason for using Purposive Sampling technique is because not all samples have criteria that fit with the phenomenon that is being researched. Therefore, the authors chose the technique of purposive sampling which specifies the considerations or specific criteria that must be met by the samples used in this study.

In this study the sample is a company that meets certain criteria. The criteria are used as research samples are: (1) Manufacturing companies listed on the Indonesia stock exchange during the period 2014–2016. (2) Manufacturing companies that provide annual report and sustainability report during the period 2014–2016 respectively. (3) Manufacturing companies that provide



data related to research variables. (4) Manufacturing companies that do not experience losses during the period 2014–2016. (5) Manufacturing companies disclosing carbon emissions (including at least one policy related to carbon/greenhouse gas emissions or disclosing at least one carbon emissions disclosure item).

In this study into a sample is 22 manufacturing companies listed on the Indonesia stock exchange. The amount is quite small, this can be due to Indonesia is still a developing country that is not required to reduce greenhouse gas emissions that affecting on the lack of information on carbon emissions owned by Indonesian companies. In addition, the objective of reducing emissions of Indonesian firms is only to bridge the developed countries in meeting their greenhouse gas emission reduction obligations, and disclosure of information in the ongoing report is voluntary, especially information on carbon emissions disclosure.

The dependent variable in this study is the disclosure of carbon emissions as measured using the carbon disclosure project index checklist developed by (Choi et al., 2013). Choi et al. (2013) establish five categories with 18 items relevant for carbon emissions disclosure. The calculation of the carbon emissions disclosure index score is done by giving an assessment on each item of disclosure with a dichotomous score, the minimum score is 0 and the maximum score is 18. Each item is given a value of 1 so that if all items are disclosed then the company score is 18.

The independent variables in this research are regulator, institutional ownership, firm size, and profitability. Regulators are measured by distinguishing between state-owned enterprises and private companies. State-owned enterprises are coded 1 and private companies are coded 0. Institutional ownership is measured by the number of institutional shares divided by the total number of shares outstanding. Company size is proxied with natural logarithm (Ln) of total company asset. Profitability proxied by ROA as measured by profit after tax divided by total assets.

Classic assumption test is done to meet the requirements of linear regression analysis, followed by hypothesis testing which includes the determination of hypothesis, statistical test, that is by multiple linear regression analysis. The model used is as follows:

$$CED = \alpha + \beta_1 REG + \beta_2 INST + \beta_3 SIZE + \beta_4 PROFIT + \varepsilon$$

Information:

CED=Carbon emission disclosure

$\alpha$ =Constants

$\beta_1$ – $\beta_4$ =Regression coefficient

REG=Regulator

INST=Institutional ownership

SIZE=Company size

PROFIT=Profitability

$\varepsilon$ =Error (Other variables not described in the model).

### 3. RESULTS AND DISCUSSION

The results of the classic assumption test can be seen in Table 1. Based on Kolmogorov–Smirnov Test showed that the  $P = 0.200$  is

$>0.05$ , it can be concluded that the regression model is normally distributed. Thus, the regression model satisfied the assumption of normality. The multicollinearity test found the tolerance value close to 1, the variance inflation factor (VIF) limit is 10, if the VIF value is below 10 which means that the mean of the independent variables is not correlated and there is no multicollinearity symptoms. The heteroscedasticity test based on the scatterplot graph shows that the points spread randomly and spread over and below the number 0 on the Y axis and did not form a particular pattern. It can be concluded that there is no heteroscedasticity because the regression model has a variance of residual homogeneity. Test autocorrelation using run test obtained value of significance 0.082 more than 0.05 which means data has been distributed randomly, so it can be concluded there is no autocorrelation.

Table 2 presents the constant of  $-242,202$  states that if no influencing factors (regulator, institutional ownership, firm size, and profitability are considered constant) hence carbon emission disclosure is  $-242.202$ . Regression coefficient of regulator marked positive equal to 18.972. Regulator is a dummy variable where 0 for private and 1 for SOE. So with a positive signified coefficient indicates that state-owned companies have carbon emission disclosure 18.972 times higher than private companies. Therefore, state-owned companies have more carbon emission disclosure than private companies.

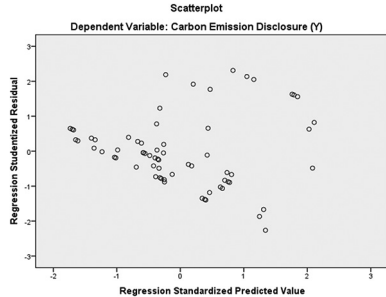
The regression coefficient of institutional ownership is negative as  $-0.197$ . This shows the magnitude of the change in carbon emission disclosure because the influence of Institutional Ownership is inversely proportional (not unidirectional). Institutional ownership increases one unit, then the carbon emission disclosure score will fall by 0.197% with the assumption that other factors are constant. So the greater the institutional ownership then the percentage of carbon emission disclosure is smaller.

The regression coefficient of variable of company size is positive sign of 9.442. This shows the magnitude of the change in carbon emission disclosure as the effect of company size is directly proportional (unidirectional). The size of the company increases one unit, so the carbon emission disclosure score will increase by 9.442% with the assumption that other factors are constant. So the bigger the company then the percentage of carbon emission disclosure is bigger.

The regression coefficient of profitability variable marked positive is 60.755. This shows the magnitude of the change in carbon emission disclosure due to the influence of profitability is proportional and linear. profitability increases one unit then the carbon emission disclosure score will increase by 60.755% with the assumption that other factors are constant. So the greater the Profitability, the greater the percentage of carbon emission disclosure.

Consider the significance value (Table 3), obtained test significance of 0.000 smaller than the error rate of 1% ( $\alpha = 0.01$ ). It can be concluded that regulator, institutional ownership, Company Size, and Profitability have an effect on carbon emission disclosure at manufacturing company listed in Indonesian stock exchange in 2014–2016.

**Table 1: Classical assumption test results**

Assumption test	Value	Results
Normality (Kolmogorov–Smirnov)		
Asymp. Sig. (2-tailed)	0.200	The residual data is normally distributed and no normality occurs
Multicollinearity		
Tolerance		The independent variables with the other independent variables are not correlated and multicollinearity does not occur
REG	0.779	
INST	0.776	
SIZE	0.940	
PROFIT	0.934	
VIF		
REG	1.283	
INST	1.288	
SIZE	1.064	
PROFIT	1.070	
Heteroscedasticity		
		There is no clear pattern, such as dots that spread above and below zero on the Y axis, hence no heteroscedasticity
Autocorrelation (run test)		
Asymp. Sig. (2-tailed)	0.082	Residual data is random and no autocorrelation occurs

VIF: Variance inflation factor

**Table 2: Coefficients**

Model	Unstandardized coefficients		Standardized coefficients	T	Significant
	B	Standard error	Beta		
1					
Constant	-242.202	54.909		-4.411	0.000
REG	18.972	9.231	0.231	2.055	0.044**
INST	-0.197	0.160	-0.139	-1.232	0.223
SIZE	9.442	1.870	0.516	5.048	0.000*
PROFIT	60.755	30.015	0.207	2.024	0.047**

\*Dependent variable: CED. \*Significant at level 1%, \*\*significant at level 5%

**Table 3: ANOVA**

Model	Sum of squares	Df	Mean square	F	Sig.
1					
Regression	21099.928	4	5274.982	10.220	0.000 <sup>b*</sup>
Residual	31485.183	61	516.151		
Total	52585.110	65			

\*Dependent Variable: CED, <sup>b</sup>Predictors: Constant, PROFIT, REG, SIZE, INST.

\*Significant at level 1%

factors not included in the variables studied in this research such as leverage, media exposure, environmental performance, age company, industrial type, and CSR.

There is a Regulator effect on carbon emission disclosure. research conducted proves that the Regulator (government) is the main driving factor for companies to pay attention to carbon emission reports. The results of this hypothesis are in line with research Huang and Kung (2010) which states that regulators have a positive influence on carbon emission disclosure. This is in line with the research Liu and Anbumozhi (2009); Peng et al. (2015) that regulator pressure has a significant relationship with disclosure of carbon emissions.

Regulators have an influence on carbon emission disclosure because governments have the power to pressure companies to be responsible for reporting carbon emissions. Governments that are aware of environmental problems due to company activity, then tend to press companies to be more environmentally responsible and reporting carbon emissions.

The multiple correlation (R) value in Table 4 is 0.633. When viewed from the level of regulatory relation, institutional ownership, company size, and profitability together with carbon emission disclosure are in the strong category (close) with the amount of correlation is at the interval 0.60-0.799.

Based on Table 4 we get information that R square is 0.401 or 40.1%. This value indicates that the influence of regulator, Institutional ownership, company size, and profitability to carbon emission disclosure, while the other 59.9% is influenced by other

**Table 4: Model summary**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard error of the estimate
1	0.633 <sup>a</sup>	0.401	0.362	22.71895

<sup>a</sup>Predictors: Constant, PROFIT, REG, SIZE, INST. <sup>b</sup>Dependent variable: CED

Institutional ownership has no effect on carbon emission disclosure. The results of this hypothesis testing are in contrast to the research by Borghei-Ghomi and Leung (2013). Institutional ownership has important meaning in monitoring management because with the existence of institutional ownership will encourage more optimal supervision. On that base, the company will disclose additional report which is voluntary. But the decision to make a voluntary disclosure is a part of management policies. So, the information disclosed by the company varies according to each company's management policies. This does not exclude the possibility that even low institutional ownership can disclose carbon emission information well if it is deemed necessary.

There is an effect of company size on carbon emission disclosure. This is in line with research Kalu et al. (2016); Luo et al. (2013). Research conducted to prove that the size of the company has a relationship with the disclosure of carbon emissions. Large companies have greater pressures from environmental concerns so they tend to improve the response to the environment. Large companies are more encouraged to provide quality voluntary disclosures to gain legitimacy.

Profitability can effect to Carbon Emission Disclosure. The results of this hypothesis are in line with the research Choi et al. (2013); Kalu et al. (2016). Research conducted to prove that Companies with good financial conditions have the ability to financially in making decisions related to the environment. Conversely, companies with poor financial performance focus more on achieving financial goals and improving their performance thus limiting their ability in preventing and reporting carbon emissions.

The implications of this research can be used as a means of investing to invest in a company that is more concerned with the environment in order to preserve nature. Because of the problem of climate change, global warming has become an increasingly widespread issue and attracted international reaction. So by prioritizing investments in environmentally friendly companies means to care for nature. Furthermore, financial institutions to make policies, more supportive, and provide convenience to companies that are more trying to maintain and improve the environmental quality of activities that endanger the environment from pollution and carbon emissions. By supporting them, the debtor's perspective will change in reaching the debt repayment target. They will be driven more concerned about environmental sustainability so that efforts in repaying loans by innovating sustainability. Ultimately the balance between the three basic pillars of business that includes profit, people, and the planet is achieved.

## 4. CONCLUSIONS

This study aims to examine the factors that affect carbon emissions disclosure in manufacturing companies listed on the BEI, namely regulators, institutional ownership, firm size, and profitability. The research results proved that the regulator has an effect on carbon emission disclosure, company size influences carbon emission disclosure, and profitability affects carbon emission disclosure, while institutional ownership does not affect carbon emission disclosure.

Based on the results this research, the suggestions that researchers can provide are as follows: (1) For the company: Institutional ownership that does not have a say will become a weakness. This can happen because some companies that are transferring institutional ownership to managerial ownership, so that monitoring from institutional investors on corporate performance is weaker. There should be a balance between institutional shareholding and managerial share ownership in order to avoid opportunistic behavior in altering the financial statements. (2) For further researchers: It is expected to use different variables such as leverage, media exposure, environmental performance, industrial type, corporate age, CSR. In addition, the next researcher is expected to add more extensive research samples so as to produce accurate research. Period of research conducted by researchers only 3 years, should be re-examined with longer periods, because it will provide greater possibility to obtain the actual conditions. Furthermore, further investigators are expected to develop other index based on the more recent GRI 2016 sustainability reporting standards.

## REFERENCES

- Asmeri, R., Alvionita, T., Gunardi, A. (2017), CSR disclosures in the mining industry: Empirical evidence from listed mining firms in Indonesia. *Indonesian Journal of Sustainability Accounting and Management*, 1(1), 16-22.
- Berthelot, S., Robert, A.M. (2011), Climate change disclosures: An examination of canadian oil and gas firms. *Issues in Social And Environmental Accounting*, 5(1/2), 106-123.
- Bewley, K., Li, Y. (2000), Disclosure of environmental information by canadian manufacturing companies: A voluntary disclosure perspective. In: *Advances in Environmental Accounting and Management*. Bingley: Emerald Group Publishing Limited. pp. 201-226.
- Borghei-Ghomi, Z., Leung, P. (2013), An empirical analysis of the determinants of greenhouse gas voluntary disclosure in Australia. *Accounting and Finance Research*, 2(1), 110-127.
- Brammer, S., Pavelin, S. (2006), Voluntary environmental disclosures by large UK companies. *Journal of Business Finance and Accounting*, 33(7-8), 1168-1188.
- Chithambo, L. (2013), Firm characteristics and the voluntary disclosure of climate change and greenhouse gas emission information. *International Journal of Energy and Statistics*, 1(3), 155-169.
- Choi, B.B., Lee, D., Psaros, J. (2013), An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review*, 25(1), 58-79.
- Cotter, J., Najah, M.M. (2012), Institutional investor influence on global climate change disclosure practices. *Australian Journal of*

- Management, 37(2), 169-187.
- Egbunike, F.C., Emudainohwo, O.B. (2017), The role of carbon accountant in corporate carbon management systems: A holistic approach. *Indonesian Journal of Sustainability Accounting and Management*, 1(2), 90-104.
- Freedman, M., Jaggi, B. (1988), An analysis of the association between pollution disclosure and economic performance. *Accounting, Auditing and Accountability Journal*, 1(2), 43-58.
- Freedman, M., Jaggi, B. (2005), Global warming, commitment to the kyoto protocol, and accounting disclosures by the largest global public firms from polluting industries. *The International Journal of Accounting*, 40(3), 215-232.
- Galani, D., Gravas, E., Stavropoulos, A. (2012), Company characteristics and environmental policy. *Business Strategy and the Environment*, 21(4), 236-247.
- Gray, R., Kouhy, R., Lavers, S. (1995), Constructing a research database of social and environmental reporting by UK companies. *Accounting, Auditing and Accountability Journal*, 8(2), 78-101.
- Gunardi, A., Febrian, E., Herwany, A. (2016), The implication of firm-specific characteristics on disclosure: the case of Indonesia. *International Journal of Monetary Economics and Finance*, 9(4), 379-387.
- Ho, P.L., Tower, G. (2011), Ownership structure and voluntary disclosure in corporate annual reports of Malaysian listed firms. *Corporate Ownership and Control*, 8(2), 296-312.
- Huang, C.L., Kung, F.H. (2010), Drivers of environmental disclosure and stakeholder expectation: Evidence from Taiwan. *Journal of Business Ethics*, 96(3), 435-451.
- Jones, P., Wynn, M., Hillier, D., Comfort, D. (2017), The sustainable development goals and information and communication technologies. *Indonesian Journal of Sustainability Accounting and Management*, 1(1), 1-15.
- Kalu, J.U., Aliagha, G.U., Buang, A. (2016), A review of economic factors influencing voluntary carbon disclosure in the property sector of developing economies. *IOP Conference Series: Earth and Environmental Science*, 30, 12010.
- Kalu, J.U., Buang, A., Aliagha, G.U. (2016), Determinants of voluntary carbon disclosure in the corporate real estate sector of Malaysia. *Journal of Environmental Management*, 182, 519-524.
- Liu, X., Anbumozhi, V. (2009), Determinant factors of corporate environmental information disclosure: An empirical study of chinese listed companies. *Journal of Cleaner Production*, 17(6), 593-600.
- Liu, Y., Zhou, Z., Zhang, X., Xu, X., Chen, H., Xiong, Z. (2015), Net global warming potential and greenhouse gas intensity from the double rice system with integrated soil-crop system management: A three-year field study. *Atmospheric Environment*, 116, 92-101.
- Luo, L., Tang, Q., Lan, Y. (2013), Comparison of propensity for carbon disclosure between developing and developed countries: A resource constraint perspective. *Accounting Research Journal*, 26(1), 6-34.
- Moir, L. (2001), What do we mean by corporate social responsibility? Corporate governance: The International Journal of Business in Society, 1(2), 16-22.
- Patten, D.M., Trompeter, G. (2003), Corporate responses to political costs: An examination of the relation between environmental disclosure and earnings management. *Journal of Accounting and Public Policy*, 22(1), 83-94.
- Peng, J., Sun, J., Luo, R. (2015), Corporate voluntary carbon information disclosure: Evidence from china's listed companies. *The World Economy*, 38(1), 91-109.
- Prado-Lorenzo, J., Rodríguez-Domínguez, L., Gallego-Álvarez, I., García-Sánchez, I. (2009), Factors influencing the disclosure of greenhouse gas emissions in companies worldwide. *Management Decision*, 47(7), 1133-1157.
- Prado-Lorenzo, J.M., Gallego-Alvarez, I., Garcia-Sanchez, I.M. (2009), Stakeholder engagement and corporate social responsibility reporting: The ownership structure effect. *Corporate Social Responsibility and Environmental Management*, 16(2), 94-107.
- Rankin, M., Windsor, C., Wahyuni, D. (2011), An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence. *Accounting, Auditing and Accountability Journal*, 24(8), 1037-1070.
- Rokhmawati, A., Gunardi, A. (2017), Is going green good for profit? Empirical evidence from listed manufacturing firms in Indonesia. *International Journal of Energy Economics and Policy*, 7(4), 181-192.
- Rokhmawati, A., Gunardi, A., Rossi, M. (2017), How powerful is your customers' reaction to carbon performance? Linking carbon and firm financial performance. *International Journal of Energy Economics and Policy*, 7(6), 85-95.
- Wang, J., Song, L., Yao, S. (2013), The determinants of corporate social responsibility disclosure: Evidence from China. *Journal of Applied Business Research*, 29(6), 1833-1848.
- Widyaningsih, I.U., Gunardi, A., Rossi, M., Rahmawati, R. (2017), Expropriation by the controlling shareholders on firm value in the context of Indonesia: Corporate governance as moderating variable. *International Journal of Managerial and Financial Accounting*, 9(4), 322-337.
- Yu, J., Lee, S. (2017), The impact of greenhouse gas emissions on corporate social responsibility in Korea. *Sustainability*, 9(7), 1135.