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Carbon Emissions Disclosure, Environmental Management System, and Environmental Performance: Evidence from the Plantation Industries in Indonesia

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Abstract: This study aims to examine the relationships between the environmental management system, environmental performance, and carbon emissions disclosure in Indonesia, a country with rich natural resources. The study focuses on the plantation industries so as to better capture the disclosure behavior of companies directly engaged in natural resources. They were all registered on the Indonesian Stock Exchange (IDX) from 2013 to 2017. The testing of the hypotheses uses multiple linear regressions. Test-F shows a model that is stable and significant. The research results show two variables that have been proven to be insignificant with regard to carbon emissions, namely the environmental management system and leverage. Research further proves that ISO 14001 and leverage did not affect the commitment to express carbon emissions. Environmental performance and age firms in this research have affected positive and significant impacts on disclosure of carbon emissions in the plantation industries. This demonstrates that companies that receive the PROPER Awards from the Ministry of Environment and Forestry are those with good environmental performance in accordance with government regulations to reduce greenhouse gas emissions.

Keywords: carbon emissions disclosure, environmental management system, environmental performance.

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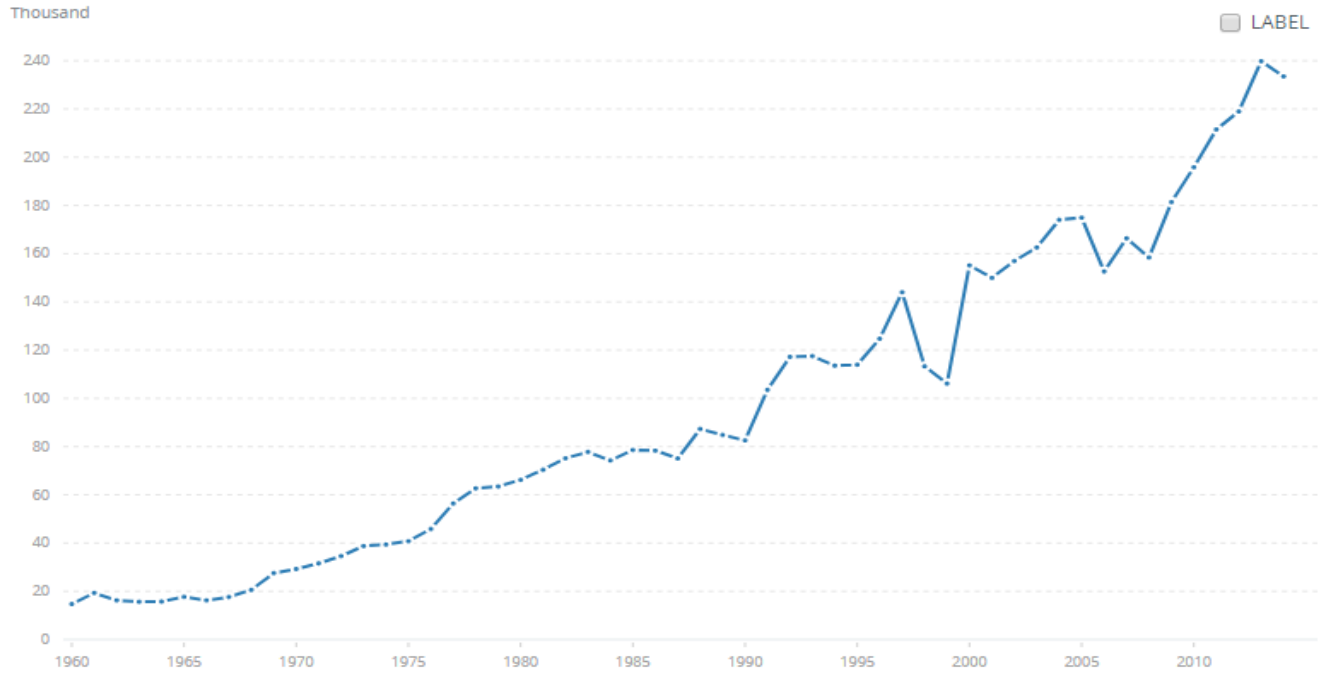
INTRODUCTION

Behind the rate of acceleration and success, world of industrial technologies has an inescapable adverse effect to the environment on the line of industry, carbon retention and the carbon emission issued by entities and the activities of other human beings which will increase gradually from time to time. The most concrete situation in environment was climate change that caused global warming which affected the environment that could not be avoided (Jones et al., 2017; Iswati, 2018). Intergovernmental Panel on Climate Change (IPCC) – an

institution formed by the United Nations which contains scientists derived from World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) – which was devoted on dealing with climate change issues, The Intergovernmental Panel on Climate Change (2017), had gathered sufficient obvious evidences and provided food security which had an impact for emissions and climate Greenhouse Gas (GHG), because of agriculture and plantation were producing GHG significant and the demand for food divergent strongly affected the GHG emissions and The Intergovernmental Panel on Climate Change (2014), which found that agriculture, forestry and other land uses were contributing on 24% source of greenhouse gas emissions in 2010.

In the free air there are six varieties of greenhouse gases. The following list based on the biggest contribution to the greenhouse gases, were: 1) carbon dioxide (CO_2); 2) methane (CH_4); 3) nitrous oxide (N_2O), the three substances that were driven by fossil energy sources, deforestation and agriculture; 4) hydrofluorocarbons (HFC); 5) perfluorocarbons (PFC); 6) sulfur hexafluoride (SF_6) which only contribute 1%. Since the industrial revolution begin, the carbon based fuel combustion quickly increased the concentration of carbon dioxide in the atmosphere, increased the rate of global warming was causing climate changes (Nasih et al., 2019). Based on Figure 1 from The World Bank Group (2014), Indonesia was 12th largest contributor from the entire countries which produces CO_2 emissions from liquid fuel consumption which was 233,504 thousand tons.



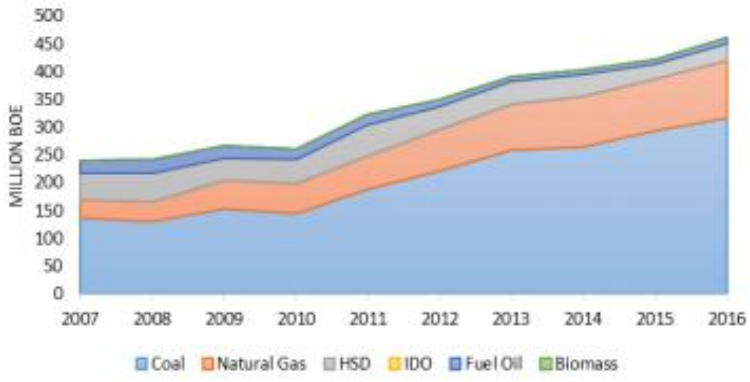
Source: The World Bank Group (2014)

Figure 1 CO_2 Emissions (Metric Tons per Capita)

The most important thing was mitigate climate change which was an unprecedented the company to recognize, to measure, to note, to serve and to express the carbon emission that they had paid (Kalu et al., 2016). According to Iswati (2018), a largest source of CO_2 was plantation power fueled by coal, motor vehicles, energy industry fossil. Real phenomenon that occurred in Indonesia was volume consumption of fuel major in

plantation power, according to data Ministry of Energy and Mineral Resources (2017), Fuel consumption for the power generation sub-category in 2016 was 462 million BOE (Barrel Oil Equivalent). This figure increased since 2007 with average grew by 7.67% per year. Consumption of fuel dominated by coal since 2007 to 2016, from 56.63% to 68.61%. This showed that the government was still relying on power stations steam (PLTU) for the electricity sector policy for the community. The data can be seen in Figure 2.

In 1993, for example, the European Union published an environmental management and audit scheme management for organization that build the Environment of Management System (EMS) certain in accordance with the directive and in 1996, The International Standardization Organization (ISO) set up its own voluntary environmental standard for EMS ISO 14001 certification (Montiel & Husted, 2009). The survey found that factories that instituted by ISO 14001 were the type of factory which had an internal management procedures that were demonstrated superiorly by environmental performance (Dasgupta et al., 2000). There was a commitment formed by the Indonesian government to reduce carbon gas emissions, the targets listed in Nationally Determined Contribution (NDC) were a decrease on emissions by 29% in 2030; 834 million tons of CO_2 for all sectors and the energy sector which had received 314 million tons by CO_2 emissions. In order to maintain the inventory of carbon emission results data, in conformity with expectation of the president through the Presidential Regulation No. 61 year 2011 on a national action plan on reducing greenhouse gases (RAN–GRK) and the Presidential Regulation No. 71 years 2011 on the implementation of the national inventory greenhouse gases, where in the regulation said that Indonesia participate in Kyoto agreement with the decreasing target by 29% in 2030 and zero emissions or net in 2050.



Source: Ministry of Energy and Mineral Resources (2017)

Figure 2 Main Fuel for Power Plants

An important aspect of climate change mitigation was the obligation of companies to recognize, measure, record, present and disclose their carbon emissions (Kalu et al., 2016). According to Kalu et al. (2016) suggested that the act of the disclosure of carbon as a tool to achieve public trust and legitimacy. In many ways, while reporting the carbon emission which was relatively new, a problem from the disclosure of a wider environment has been nationally be in a variety of senses for over the years (Choi et al., 2013). Besides, research conducted in Indonesia on the subject of the voluntary disclosure carbon emission was still limited to be researched, one empirical study was done in Indonesia by previous studies (Hermawan et al., 2018) were selected from State–Owned Enterprises, stated that the government regulator or rules, size firms and the profitability have an important effect on the disclosure of carbon emission in Indonesia. While, research conducted by Nasih et al. (2019) with a sample of mining and agricultural companies, said that the size of board

structure and the size firms have a significant positive relationship on the disclosure of carbon emissions and the mining industry companies which have more high disclosure scores related to carbon emissions.

Studies conducted in Indonesia, the environmental performance that measured by Assessment Program Rank the Company Performance (PROPER) index showed the inconsistent against the disclosure of the environment. Ulfa & Ermaya (2019) that had a media exposure significantly affected the extent of carbon emission disclosure. Meanwhile, environmental performance and type of industry had no significant effect on the extent of carbon emission disclosure. Halmawati & Oktalia (2015) showed that environmental performance and profitability have no effect on corporate social responsibility disclosure. Meanwhile, Prafitri & Zulaikha (2016) showed positive and significant effect on the disclosure of greenhouse gases. Fernando & Fachrurrozie (2017) research found that greenhouse gas emissions disclosure and environmental performance have a positive effect on firm value and environmental performance that can be moderated to the relationship between greenhouse gas emissions disclosure and firm value.

The application of environmental management system with ISO 14001 certificate was to be able on assisting organizations to control and improve the environmental performance and could reduce the impact of excessive operations on the surrounding environment. Rankin et al. (2011); Yunus et al. (2016) said that environmental management system with ISO 14001 certificate had an effect on managing greenhouse gas emissions for companies in Australia. Prafitri & Zulaikha (2016) showed a consistency with the previous research, EMS had contributed on greenhouse gas emissions on companies in Indonesia. Meanwhile, Manurung & Rachmat (2019) said that the ISO 14001 variable had a negative effect on the disclosure of corporate social responsibility in Indonesia's industries.

The information report about carbon emission was the new relative concept and Indonesia was still voluntary in nature, there were several strong accounting literature that takes into account of theoretical explanation for entity decision to make the disclosure of social and environment (for a summary see Gray et al., 1995). The accepted theory consisted with the disclosure of social and environmental legitimacy. The theory number of previous studies based on the legitimacy theory to examine, accountability agency including the disclosure of organization. Legitimacy was "perception or a major assumption that was desired, an entity proper or appropriate in some systems, norms, value, trust and who's built in definitions social" (Suchman, 1995). The legitimacy of the theory showed that the build on the legitimacy of perceptual organization as the relevant responsible by the public (Kuo & Chen, 2013). As a consequence of increasing attention to environmental, resulting in most companies to engage on practicing responsibility to the environment and social surrounding.

Research surrounding which was on disclosures of carbon emission had been developed in the developed country like United States, Canada and Australia which rapidly caught worldwide attention because of the company business activities. There were a lot of research that examined several factors that motivated the carbon disclosure in secure information voluntarily, in developed countries, a tendency to reveal information of carbon remained in unexplored territory (Luo et al., 2013). One theory that widely used was to understand the best disclosure factors of environmental and social as a legitimacy theory, which suggested the concept of "social contract" between organization and society in general (Choi et al., 2013).

Important matters were concerning the legitimacy theory for organization that were limited norms and social value by companies that want to convince groups of people that they were concerning the environment (Nasih et al., 2019). This theory can explain the motivation behind environment by an organization. Practices the responsibility of the company involvement is the good intention and the environment and the work of firm in mitigate the carbon emission that caused climatic changes, and to increase image of companies due to the following activity which involved in practice responsibility. The types of the risk can directly trigger a response

of legitimacy because they change the perception of parties to social contract which must be preserved by the company. In the context of legitimacy, the company admit practices environmental sustainability into the company strategy as a consequence from the increasing demand for responsive environment (Yunus et al., 2016). Additional disclosure voluntarily can be shown that the company took its social and environmental responsibility seriously, and produce a positive image among the non–profit organization, the government and investors (Hasan & Yun, 2017; Lestari et al., 2019).

In the implementation of the voluntary disclosure such as gas carbon emissions on some countries had set and developed the requirements of the disclosure of obliged in the form of anything (Nasih et al., 2019). But, most of the information urged disclosure pollution voluntarily. Proposed that disclosure pollution voluntarily will take good intentions in a market economy. In addition, this will facilitate investors to reach a decision investment. In addition, manager companies should be required to reveal information about pollution voluntarily to convey a positive signal about the company future.

Nowadays, the companies are required to not only being focused on the profit side, but they should also look at non-financial terms (additional information). This article was motivated by several problems. The motivation for research was invented by the decision to investigate the cases of carbon emission that was related to environmental performance to overcome, to own a company, to manage and to measure the waste produced by the company. Unlike the social, political, and economic impacts that directly affect the company, the environment ones had no direct effect on the company (Fernando & Fachrurrozie, 2017). Based on phenomena that occurred on the impact of carbon emissions and the results of previous studies were inconsistent. This motivated us to conduct a research of environmental management system and environmental performance against the disclosure of voluntary carbon emissions at plantation company in Indonesia.

METHODS

This research used a quantitative research approach. All data was numeric. The research model used multiple linear regression models. Three types of variable was used in the study, namely the independent variable, the dependent variable and control variable. The independent variable that was used was the performance of the environment and ISO 14001. Environmental Management System was measured using dummy 1 for companies that had an Environmental Management System with an ISO 14001 certificate, and 0 otherwise, adopted from research (Rankin et al., 2011; Yunus et al., 2016). Environmental Performance was measured using Environmental Performance Indicators (EPI) and was defined based on context and content according to the company being assessed. PROPER performance ratings are ranked in five colors: Gold (Excellence, score 5), Green (very good, score 4), Blue (good, score 3), Red (bad, score 2), Black (very bad, score 1). Adopted from the research of Prafitri & Zulaikha (2016).

The dependent variable for the carbon emission was measured by the disclosure of the carbon emission proxy. The measurement of the disclosure of the emission of carbon was used in the research covered by an item that adopted from research Choi et al. (2013) and developed a checklist based on Carbon Disclosure Project (CDP) information which was translated into 18 carbon index items and widely used by previous researchers conducted in Asia, Australia and Canada.

The control variables on this research were age firms and leverage. The age of the company was measured by the year the company was founded, the adoption of the research Yunus et al. (2016). While, leverage off debts owed and measured by total assets at the end of fiscal, adopted from Yunus et al. (2016);

Kılıç & Kuzey (2019). This study used variable control of age firms and leverage serves to balance and also controlled by independent variable out of research model. Previous studies had shown age firms and leverage influence voluntary disclosure.

The population of this research was all plantation companies that were registered on the listing companies in Indonesia. The Intergovernmental Panel on Climate Change (2017), it had gathered sufficient obvious evidences and provided a food security to have an implication for emissions and climate Greenhouse Gas (GHG), because agriculture and plantation was producing GHG significant and demand for food divergent strongly GHG impact on emissions.

Study sample determined by using techniques of purposive sampling with several predetermined criteria, namely, Companies that follow the Company Performance Rating Program (PROPER), provided reports annually or sustainability report during 2013–2017 in a row and issued by carbon emission disclosure policies (at least one policy related to carbon emissions/greenhouse gases or disclosing at least one carbon emission disclosure item). These two criteria resulted in sample of 13 companies with a total of 45 analysis units. The research model used multiple regression analysis as follows:

$$CED = \alpha + \beta_1 Environmental\ Management\ System\ (EMS) + \beta_2 Environmental\ Performance\ (EP) + \beta_3 Age\ Firms\ (Age) + \beta_4 Leverage\ (Lev) + \varepsilon$$

Data analysis technique of the research was multiple linear regression technique analysis and the worship of idols. The test was done by using some statistics program application STATA 14. The significance levels that were used were 1%, 5% and 10%.

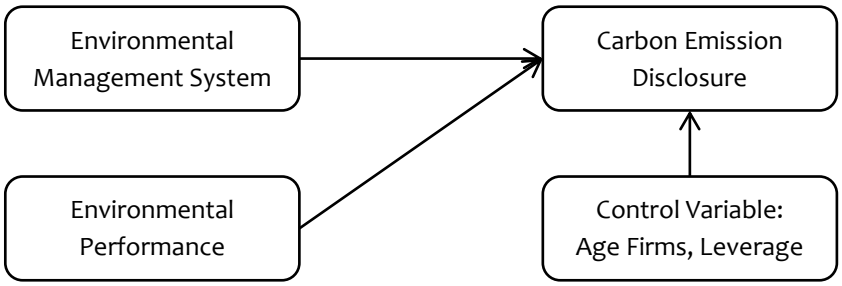


Figure 3 Conceptual Framework

RESULTS AND DISCUSSION

The outcome Table 1 is showing a matrix Pearson correlation test to know the power of the relation between variables. Environmental Management System (EMS) is having negative correlation and not significant with CED. Interestingly, the Environmental Performance (EP) have a positive correlation and 1% significant with CED. In other words, it shows that companies with good environmental performance will reveal higher carbon emissions. Age Firms have a positive correlation and 5% significant with CED and aged companies realized that the aspect of environment about the carbon emission is important. Leverage is having negative correlation and is not significant with CED.

Table 2 provides the results of the descriptive statistics for all variables in the research by the total number of observations 45 publicly–listed plantation company. Based on these results that the environment performance variables measured with an index score and maximum score with a score of 4. While minimum value with a value of 3. On the variables of the aged company, samples to publicly-listed plantation company in Indonesia to have the aged company maximum 111 years. While, a rating company of age minimum 7 years. On the level of the disclosure of the carbon emission the maximum score with a value of 0.33. While, minimum value on the disclosure it was lower carbon emissions.

Table 1 Pearson's test correlation of research variables (N=45)

Variable	CED	EMS	EP	Age	Lev
CED	1.000				
EMS	−0.191	1.000			
	(0.210)				
EP	0.492***	−0.444***	1.000		
	(0.001)	(0.002)			
Age	0.374**	0.118	−0.147	1.000	
	(0.011)	(0.440)	(0.336)		
Lev	−0.041	−0.138	−0.250*	0.208	1.000
	(0.788)	(0.365)	(0.097)	(0.171)	

p–values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

Table 2 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
EMS	45	0.8	0.40452	0	1
EP	45	3.2	0.40452	3	4
Age	45	52.08889	37.46927	7	111
Lev	45	0.48474	0.223342	0.082294	1.03374
CED	45	0.211111	0.062226	0.111111	0.333333

Table 3 Results of Multiple Linear Regression

Variable	Carbon Emissions Disclosure (CED)			
	Coef.	Std. Err.	t	p > t
EMS	0.034773	0.0232868	1.49	0.144
EP	0.102014	0.0210401	4.85	0.000***
Age	0.000761	0.0001862	4.09	0.000***
Lev	−0.006263	0.0338727	−0.18	0.854
Constant	−0.203027	0.0880551	−2.31	0.027
N	45			
R^2	0.5773			
Adj–R^2	0.4833			
F	0.0001			
Normality	0.8815			
Heteroscedasticity	0.5306			
Year Dummies	Included			

p–values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

The results in Table 3 for the classic assumption test on the regression model, normality test using Skewness–Kurtosis Test shows 0.1681 > 0.05, it can be concluded that the regression model is normally

distributed. Thus, this regression model criteria have the normality assumption. The Heteroscedasticity test using the Breusch–Pagan Test shows that the value 0.0942 > 0.05, so it can be concluded from these results that the regression model does not experience symptoms of the Heteroscedasticity. The multicollinearity test shows that the overall value of VIF shows < 10 with an average value of 1.68 VIF. It can be concluded that the linear relationship between independent variables in the regression model does not occur multicollinearity deviations. R–Squared of 0.5773 or 57.73%. When viewed relations between variables independent and dependent variable in the model regressions strong category referred to the number of correlation at intervals 0.40–0.60. While other 42.27% influenced by other factors are not included in variables that were investigated in this study as corporate governance, environmental committee, sustainability committee and firms value.

On the outcome of Table 3 shows the results of the analysis that are being tested in the equation of regression research model. The regression equation is negative constant value of –0.2030 claimed that if there was no variable environmental management system, environment performance, age firms and leverage, so the disclosure of carbon emissions as much as –0.2030. On the regression coefficient, Environmental Management System ISO 14001 positive 0.034 (in line), then showed that an increasement in one unit of Environmental Management System ISO 14001 will increase the disclosure of the carbon emission of 3.4%. The value of the environmental performance positive 0.1020 (in line), it can be argued that increasing a unit of environmental performance would increase disclosure of carbon emission by 10.20%. On the outcome of the value control variables namely, value of age firms showed positive 0.0007 (in line), it can be argued that increasing unit of age firms would increase disclosure of carbon emission by 0.07%. Value from leverage negative –0.0062 (in line), and suggests that increasing a unit leverage would increase disclosure of carbon emission 0.62%

Based on the results of the regression analysis test on the Table 3 states that Environmental Management System positive is not significant, then the H1 is not supported. Patten & Crampton (2003) give evidence that the involvement of companies in ISO 14001 are leading to the environment disclosure higher. Other requirements of ISO 14001 is to continue and to renew the environmental management system and includes the environmental problems currently related to the carbon emission. Dianawati (2016) a company that owns certificate of Environmental Management System ISO 14001 has not been able to minimize and manage the pollution pertaining to the carbon emission and still focusing on the creation of the results of the final product. Implementation and certification of EMS helps the company to integrate with environmental management system, health and their safety and in some cases, system management of the environment and their qualities (Rankin et al., 2011). Probably because of Environmental Management System with ISO 14001 certificate required the participation of employees and a strong initiative and high environmental training programs, so that the company can report increased of awareness in the environmental aspects of their work and their responsibility and image of companies to reduce the negative impact perspective from stakeholders.

Certificates of Environmental Management System ISO 14001 gives confidence to show it to external sides of company and that the company having control of important aspect of the operating system and committed to adhere with environmental regulations to be relevant and they continued to seek an improvement of the performance of their environment (Dianawati, 2016). The results of the output from the regression from our point of view, might be Environmental Management System ISO 14001 certificate are not yet able to reflect or reference a company to be able to manage and mitigate the risk of climate change caused by the carbon emission that wastes approval of the result of the process of the firm operations and the results of the final product is still focusing on environmentally friendly. Dianawati (2016) showed the low awareness of companies in Indonesia to pay attention to the importance of environmental factors in the production process. As a result research is in line with Dianawati (2016).

Based on the results in Table 3 showed that the environment performance played an important role as measured by PROPER index which produces values as significant positive, it can be said H2 supported. The reason behind the result of this research is a legitimacy theory where the performance of the company which has better environment having a tendency do the disclosure of its environment in a credible and informative reading to the public. That is because of the existence of an pressure of external and internal so that confidence in the community keeps harmonious as well as to receive support from the community (Prafitri & Zulaikha, 2016). The measurement of PROPER standard formed by the government to achieve the reduction of carbon emissions, hazardous waste management and poisonous matched those and effective in supervision of reduction of emission, as well as the commitment of Indonesia which is poured on the regulation of presidential decree No. 61/2011 and presidential decree No. 71/2011 it's runs consistently.

The Indonesian government made a PROPER (Corporate Performance Rating Program) an effort of the Ministry of Environment (KLH) to encourage corporate governance in environmental management through informative instruments (Deswanto & Siregar, 2018). Based on this, the company can improve its image and reputation by participating in PROPER. The company will show its concern by improving the performance of its environmental management and information about the company's performance related to its environmental (Ulfa & Ermaya, 2019). These proactive companies strive to manage and mitigate the risks of climate change caused by CO2, Rankin et al. (2011) by applying strategy manage the environment and policies to handle gas emissions and to develop specific initiatives that greening excellence will gain a place in society. The research was based on (Prafitri & Zulaikha, 2016).

The result of the control variables shows that the age firms have a key role in a reduction of the carbon emission. It can be caused by the age of the operating companies in the event would indirectly conscious and sensitive to the environment caused by the operational activities as well as versed in managing or mitigate waste it produces, the result was in line with Khan et al. (2013). While, the result variable leverage was measured by the ratio of the total duty to total assets can increase carbon emission disclosure. That reason can be caused by several factors one of them was the possible resources owned by plantations company in Indonesia which had resources being scanty or less to released a report addition as voluntary disclosure because need a large enough to publish them and possibly resources fully owned to focus on allocations for expenses to another operational. In line with the outcome of this research (Rankin et al., 2011; Kılıç & Kuzey, 2019).

Table 4 Results of Robust Test

Variable	Carbon Emissions Disclosure (CED)			
	Coef.	Robust Std. Err.	t	p > t
EMS	0.034773	0.0248729	1.40	0.171
EP	0.102014	0.0285947	3.57	0.001***
Age	0.000761	0.0001494	5.09	0.000***
Lev	−0.006263	0.0282969	−0.22	0.826
Constant	−0.203027	0.105765	−1.92	0.063
N	45			
R^2	0.5773			
F	0.0000			
Year Dummies	Included			

p–values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

Table 4 is the results of the robustness test. In regression testing finds things that are violated in testing classic assumptions. This testing can be taken to reduce bias from the results of research and it is important to analyze data which are affected by outlier and minimize the influence of outlier against a model so that it will obtained a model that is best. This finding is also strong with almost no difference with multiple linear regression with a significant level.

CONCLUSION

According to the analysis and discussion that has been discussed above, there are three drawing conclusions based from framework research H1 which is not supported, so that the Environmental Management System ISO 14001 have no influence disclosure to the high carbon emission on plantation company. This means that companies that get the PROPER award from the Ministry of Environment and Forestry are companies that have good environmental performance and can manage carbon emissions from operational activities of the company. The results of the control variable states that the age of the company is one of the factors determining companies reveal additional information and leverage is one of predictor who does not affect in this is research.

The research carried out is still limited to plantation industries so that it has not maximized the disclosure of carbon emissions to companies, especially related to the impact of environmental management system ISO 14001 certificate and environmental performance which is still minimally implemented by companies and matching 2 reports i.e., annual report and sustainability report. Advice for the research is the sample expected to expand outside companies that were chosen based on the presidential regulation No. 61 year 2011 and the presidential regulation No. 71 year 2011 so that the research can be generalized and the next research can modify the simple regression to be moderated by adding proxy variables such as corporate governance, environmental committee and sustainability committee.

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