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by Heri 3

Strengthening PROPER Implementation to Improve Transparency in Managing Carbon Emission among Indonesian Manufacturing Companies

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Abstract: Corporate Performance Evaluation Program (PROPER) has some objectives such as curbing carbon emissions. This program evaluates and assigns ratings to the companies' performance in managing environment. This study aims to (1) examine the effects of environmental performance (PROPER rating) on Carbon Emissions Disclosure (CED); and (2) identify the determinants of PROPER rating. Reckoning with carbon emissions checklist from Carbon Disclosure Project (CDP), data are gathered from 144 firms. The average of CED among Indonesian manufacturing companies is still relatively low (24%). Path analysis shows that CED is influenced by PROPER rating and Board Size, but not by Leverage and Profitability. Board Size and Profitability are important determinants of PROPER rating, but Leverage and Company Size are not. PROPER is considered effective to improve companies' transparency in managing carbon emissions among Indonesian manufacturing companies.

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INTRODUCTION

Global climate change is an international issue that needs to be solved comprehensively by all countries. Carbon emissions have been the main trigger of the ongoing global warming (Solomon, Plattner, Knutti, and Friedlingstein, 200. As a country inhabited by more than 250 million people, Indonesia ranked sixth on the list of top global emitters in the world with high intensity of carbon emissions (Ge, Friedrich, and Damassa, 2014). In 1990, the country emitted as many as 0.16 billion tons of carbon and increased up to 0.49 billion tons in 2012 (Oliver, Janssens-Maenhout, Muntean and Peters, 2013).

Inevitably, GDP growth and energy consumption have positive relationship meaning that a country with high GDP growth tends to have high energy consumption. Longitudinal research conducted in Mexico provides evidence that energy consumption has a significant influence on national income (Arouri, Uddin, Chakraborty, Chaibi and Foulquier, 2014). Similarly, Odhiambo (2012) finds that energy consumption in South Africa increases both carbon emissions and economic growth.

The development of industrial sectors in Indonesia also contributes significantly to carbon emissions. Statistical data issued by Netherlands Environmental Assessment Agency indicates that carbon emissions from Indonesia tend to gradually increase over years (Oliver et al., 2013). Therefore, as substantial carbon emitters, firms should improve their environmental management and increase their transparency on environmental information (Li, Zhao, Sun and Yin, 2017). In an attempt to overcome this problem, the government of Indonesia (GOI) has ratified a pact to decrease carbon emissions by 26% in 2030 (Goldenberg, 2015) and provide electricity from renewable sources by 23% in 2025 (IRENA, 2017). One of the strategies to manage carbon emissions, GOI implements Corporate Performance Evaluation Program (PROPER).

PROPER is a mechanism of evaluating firms in managing water, air and marine pollution, hazardous and poisonous waste and land degradation (KEMENLHK, 2015). Ministry of Environment and Forestry (KEMENLHK) has required all companies to implement PROPER in order to minimize negative impacts of manufacturing activities. In assessing the companies' environmental performance, the ministry employs guidelines and criteria based on the Ministry Regulation Number 06/2013 (MENKLH, 2013). As a result, the program could curb carbon emissions produced from firms as many as 38.9 million tons in 2015 (KEMENKLH, 2015). Under the Indonesian law No 32/2009 article 68, all firms are obligated to be responsible to the environment. In 2015, the government have performed evaluations on 2,137 companies (KEMENLHK, 2015). Under PROPER, a polluter is assigned one of five color ratings which are gold as excellent, green as good, blue as adequate, red as poor and black as very poor in managing environment.

There are two objectives of the study *i.e.* to understand the effectiveness of PROPER—as a proxy of environmental performance—in promoting manufacturing companies to report carbon emissions in their annual financial statements and to identify the determinants of PROPER among Indonesian manufacturing companies. Providing adequate information on carbon emission in annual reports is a form of corporate responsibility towards environment and communities. The delivery of this information aims at gaining legitimacy from the public (Dowling and Pfeffer, 1975).

In addition, conveying this message also means that the company provides benefits to the stakeholders (Freeman, 1984). It is important for the company to do so, since the communities are becoming more aware of environmental sustainability and willing to purchase green product (Genoveva, 2016). The communities also have started switching to green products for their daily consumption (Handriana, 2016).

Prior studies investigate some possible factors influencing Carbon Emission Disclosure (CED) of companies, such as those conducted by Akhiroh and Kiswanto (2016), Bae Choi, Lee and Psaros (2013), Kusuma, Manurung, Oktari, and Hasnatarina (2016), and many others. Their research mainly focuses on identifying factors that influence CED. The factors are those originating from internal firms, such as profitability, liquidity, size, age, and others. PROPER rating—an evaluation conducted by Ministry of Environment and Forestry—is also treated as a determinant parallel with others. As a matter of fact, to accomplish an excellent environmental performance (PROPER rating), firms should be equipped with considerable sources (Doonan, Lanoie and Laplante, 2005). This is due to the coverage of PROPER that consists of all aspects of environmental pollutions including land degradation (KEMENLHK, 2015). Therefore, PROPER has become the main concern for companies in dealing with environment.

Companies should obtain legitimacy from some parties to run their business (Dowling and Pfeffer, 1975) to avoid social pressure, especially for go-public companies which are driven to be more transparent to report their both financial statements and carbon emissions. In addition, Government of Indonesia (GOI) applies pressure to the manufacturing companies by imposing regulation on PROPER to ensure they manage environment properly (KEMENLHK, 2015). The implementation of PROPER is an expensive investment for firms to produce adequate environmental information including information about carbon emission. Hence, this study attempts to reveal the impacts of environmental performance measured by PROPER rating on CED. As environmental management needs sufficient human resources, funding and management (Doonan, Lanoie and Laplante, 2005), this study proposes two problems. (1) What are the factors determining environmental performance? (2) Does Environmental performance influence CED among Indonesian manufacturing companies?

LITERATURE REVIEW

There are at least two prominent theories grounding this study *i.e.* legitimacy and stakeholder theories. The former posits that for a company to continue to exist, it must operate its business in line with society's values and norms (Dowling and Pfeffer, 1975). Moreover, O'Donovan (2002) suggests that as compensation towards society and environment, a company is to undergo public disclosure on social and environmental information in its annual report. Stakeholder theory argued by Freeman (1984), contends that the existence of company should benefit not only to the company itself, but also provide benefits to its stockholders (Gray, Kouhy, and Lavers, 1995).

Disclosing information about the impact of the company's operations on the environment is becoming more important to minimize environmental degradation. (Hutchison, 2011) contends that environmental disclosure is increasingly pivotal

along with the increasing of both harmful-substance pollution and pollution cleanup costs. Carbon Emission Disclosure (CED) is an act committed by a company to provide information about its carbon emissions. Delivering this environmental information would have positive impact on companies' value (Saka and Oshika, 2014). However, in Indonesian business context, environmental disclosure in the annual report is still considered voluntary (Kusuma, Manurung, Oktari, and Hasnatarina, 2016), so the communities have only limited environmental information from the company. In some EU countries, environmental reporting has become a mandatory to be disclosed in annual financial statements (Costa and Agostini, 2016; Fallan, 2016). Nevertheless, research conducted in Italy and Norway on the mandatory of environmental disclosure in annual reports still shows unsatisfactory results (Costa and Agostini, 2016; Fallan, 2016). Likewise, research conducted on American companies participating in the RGGI program also provides almost similar results (Freedman and Park, 2014).

PROPER and Carbon Emission Disclosure

To measure CED, Bae Choi et al. (2013) utilize a carbon emission checklist developed by Carbon Disclosure Project (CDP). The list consists of six categories *i.e.* climate change, Green House Gas (GHG) Emissions, energy consumptions, GHG reduction and cost and GHG emission accountability. Altogether, there are 18 items of disclosure. This check list becomes a reference to examine CED in annual financial reports, like the one employed by Kalu, Buang, and Aliagha (2016).

This study considers PROPER rating as a company's performance in managing environment. PROPER could be viewed as a government pressure to the companies to manage the environment properly. A prior study discovers that external parties also put pressures on companies to disclose carbon emissions in annual reports (Gonzalez-Gonzalez and Ramirez, 2016; Liesen, Hoepner, Patten, and Figge, 2015). A study carried out by Akhiroh and Kiswanto (2016) exposes a fact that environmental performance does not impact on CED. However, Dawkins and Fraas (2011) provide a result that corporate environmental performance significantly correlates with climate change disclosure. Al-Tuwaijri, Christensen and Hughes (2004) also verify that there is a significant correlation between environmental performance and the level of voluntary environmental disclosure reported in companies' annual reports. PROPER rating as an achievement of environmental management could be a substantial indicator towards the availability of carbon emission information in the company. Therefore, this study concludes that the better the PROPER rating is, the more comprehensive the information that a company publishes in its annual report is. The study posits the following hypothesis:

Hypothesis 1: PROPER rating has positive impacts on carbon emission disclosure of manufacturing companies listed in IDX

The Effect of Board Size on PROPER and CED

Corporate Good Governance (GCG) aims to encourage a company to implement management with principles of transparency, accountability, responsibility, independency and fairness (KNKG, 2006). In implementing GCG, both boards of

commissioners and directors play pivotal roles to provide acts of responsibility towards society and environment. As a reflection of GCG implementation, previous studies use board characteristics as proxy of GCG. In this case, Naseem, Rias, Rehman, Ikram, and Malik (2017) consider board size an important board characteristic. Hence, the board of commissioners proxied by board size positively impacts both CED and PROPER rating (Saragih, Nugroho and Eko, 2013). In accord with this, Liao, Luo, and Tang (2015) argue that a company with more members of the board commissioner tends to be more concern about environmental issues. Rankin, Windsor and Wahyuni (2011) also find that quality of corporate governance positively correlates with voluntarily disclose of GHG emissions. This leads to the following hypotheses:

Hypothesis 2:   Board Size affects environmental performance
Hypothesis 3:   Board size affects carbon emission disclosure of manufacturing companies in Indonesia

The Effect of Profitability on PROPER and CED

To properly manage environment, a company should have sufficient financial resources (Doonan et al., 2005) as it is becoming more expensive for the companies to cleanup pollutions from their operation (Hutchison, 2011). Nevertheless, environmental management is important for the companies for maintaining their legitimacy in the community (Dowling and Pfeffer, 1975) as well as providing secure atmosphere or benefits for them (Gray et al., 1995). A company with sound financial performance would have no difficulty to make both structure and infrastructure investments for the purpose of managing environment. As one of indicators of financial performance, profitability is likely to affect PROPER rating. A study conducted by Kim (2015) shows that profitability and environmental performance have contingent causality direction. Even though, carbon emission disclosure is part of environmental reporting (Kusumah, Manurung, Oktari, and Hasnatarina, 2016), the influence of profitability on environmental reporting and carbon emission disclosures seems to be insignificant (Kusumah, Manurung, Oktari, and Hasnatarina, 2016); Yusoff, Othman, and Yatim, 2013).
    Another study points out that profitability does not impact carbon emission disclosure (Bae Choi et al., 2013; Rankin et al., 2011). Moreover, Yanto and Muzzammil (2016) find that profitability has negative effects towards environmental reporting. In this case, O'Donovan (2002) provides an explanation that if a company is in a good financial performance, comprehensive information on environmental reporting is not necessary to be published to prevent investors from disturbance when examining financial statements. Besides, it is voluntary to disclose carbon emissions in financial statements albeit the Law of the Republic Indonesia No 32 of 2009, Article 68 that requires all firms to implement PROPER. This leads to other formulations of hypotheses as mentioned below:

Hypothesis 4:   Profitability proxied by ROA affects PROPER rating of Indonesian manufacturing companies
Hypothesis 5:   Profitability does not affect CED of Indonesian manufacturing companies

The Effect of Company's Leverage on CED and PROPER

To generate quality of environmental information, firms should make investments in the project of environmental management. In this case, the company should incur expenses on information costs. On the other hand, those with high leverage have to pay higher cost of capital. This may result in cutting down expenses on information costs. Belkaoui and Karpik (1989) contend that leverage positively affects company's social information disclosure. Correlation analysis performed by Bae Choi et al. (2013) reveals a fact that leverage holds a positive relationship with CED while regression analysis displays insignificant beta. According to Yanto and Muzzammil (2016), leverage positively affect environmental reporting of mining companies in Indonesia.

Regarding the above-mentioned statements, Law No. 32 of 2009 compels all firms to actively engage in the environmental management. This indicates that the implementation of PROPER not only depends on the leverage, but also depends on the law enforcement. In this case, the company implements PROPER for the purpose of complying with the law, but PROPER rating is also determined by internal factors such as leverage. Nevertheless, Supiyanto and Pratiwi (2017) find that leverage does not affect environmental performance of manufacturing companies. Thus, this study comes up with these below-mentioned hypotheses.

Hypothesis 6: Leverage significantly affects CED of manufacturing companies in Indonesia

Hypothesis 7: Leverage does not affect environmental performance measured by PROPER rating

Company Size and Board Size

Assets could be measures of economy of scale as well as resources owned by company. Company size proxied by assets possession is a salient corporate characteristic (Dang and Li, 2014). A study conducted in Indonesian mining companies discovers that company size positively impacts on environmental reporting, but negatively influence leverage (Yanto and Muzzammil, 2016). On the other hand, a study conducted in Australian firms reveals that company size does not influence CED (Bae Choi et al., 2013).

Size measured by company's assets has a significant effect on Board Size (Dang and Li, 2014). It seems that the study focusing on the effect of company size on board size is limited in number. Most prior studies utilize company size and board size as predictor variables. Viewed from their duties, the board of commissioners is held accountable to perform supervisory job and provide suggestions to the board of directors. Law of the Republic of Indonesia No 40 of 2007 article 108 promulgates that boards of commissioners shall consist of one or more members, except companies whose business activities are related to the collection and/or management of the public's funds. Relating to this issue, larger company would have higher economy of scale and have more complexity of business. Therefore, a bigger company would require more board of commissioner members. Therefore, the study formulates the following hypothesis.

Hypothesis 8: Size positively affects board size in Indonesian manufacturing companies

The Effect of Company Size on Profitability, Leverage, and PROPER

There are two findings about the effect of company size on profitability. First, size does not affect profitability in mining companies (Yanto and Muzzammil, 2016). Second, company size significantly impacts on profitability measured by ROA (Doğan, 2013). By analyzing 24,852 companies, a study conducted by Dang and Li (2014) finds that company size has a significant effect on profitability measured by ROA. Moreover, a bigger company is likely to have higher economy of scale, so it can reduce fixed cost per unit which lead to reduced cost of goods sold. By considering economy of scale and previous research findings, this study posits the following hypothesis:

Hypothesis 9: Larger companies tend to obtain higher profitability

There are considerable number of studies on the relationship between company size and leverage that come up with the same findings. By using correlation analysis, Bae Choi et al. (2013) reveal that there is a positive relationship between company size and leverage. Dang and Li (2014) also detects positive effects of company size on leverage. In other words, bigger company tends to have higher leverage. In their study, Marete (2011) confirm this finding with the same result. These findings are plausible as bigger companies at least have three advantages to obtain cash from liability. First, bigger companies are likely to have better cash flow than smaller ones which enables them to gain cash whenever they are experiencing financial distress (Shuetrim, Lowe, and Morling, 1993). Second, bigger companies tend to have lower information asymmetry enabling them to obtain additional liability (Brierley, 2005). Third, they have bigger chances to gain trust from investors willing to invest money in their companies (Ezeoha, 2008). Consequently, this study offers this following hypothesis:

Hypothesis 10: Larger companies tend to possess higher leverage

To gain a sound environmental performance, firms are required to own adequate structures and infrastructures. Studies on determinants of environmental performance seem to be limited in number. Doonan et al. (2005) contend that a firm shall provide proper human resources, funding, and environmental management for better environmental performance. It seems that bigger firms would have adequate sources to invest in structures and infrastructures of environmental management. Consequently, this study offers this following hypothesis:

Hypothesis 11: Larger companies possess better environmental performance (PROPER rating).

Based on previous literature review, the study proposes eleven hypotheses consisting of nine alternative hypotheses and two null hypotheses. Figure 1 is a model developed for this study depicting the summary of the hypotheses.
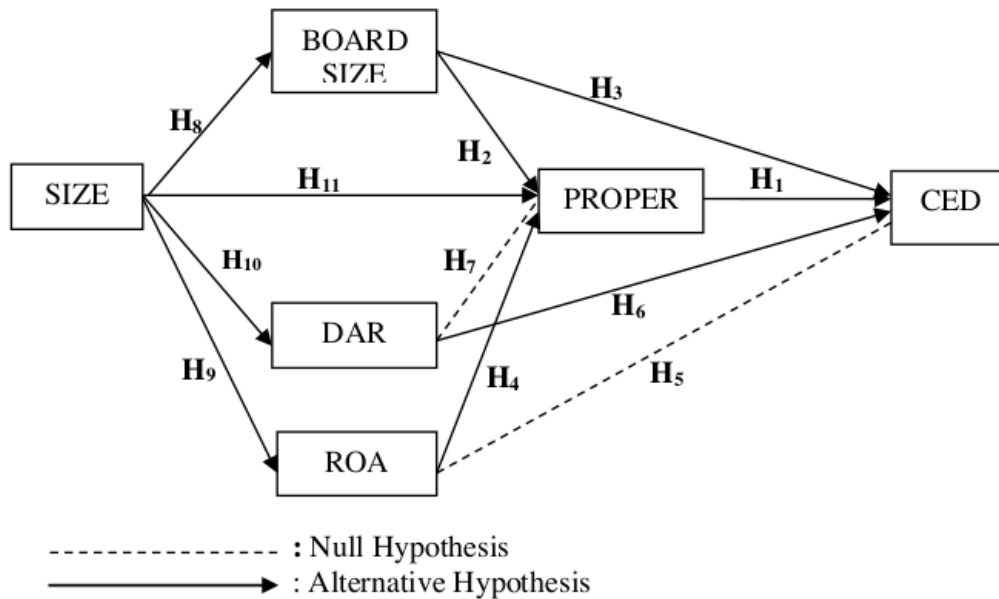
Figure 1: Theoretical model

METHODOLOGY

Population and Sample

The population of this study is all manufacturing companies listed in IDX in 2013, 2014 and 2015 reaching the number of 440 companies. By employing purposive sampling technique, the study collected 144 data from Indonesian manufacturing companies. This sample size is considered sufficient for the purposes of path analysis (Wolf, Harrington, Clark and Miller, 2013) and normality test (Ghasemi and Zahediasl, 2012).

Variables Description

This study employs six variables *i.e.* Carbon Emission Disclosure (CED), PROPER, ROA, Debt-Asset Ratio (DAR), Board Size and Company Size. CED is examined with content analysis by identifying reported items in financial reports. Considerable number of studies has employed this analysis like the one conducted by Bae Choi et al. (2013) to identify carbon emissions in financial reports. Trireksani and Djajadikerta (2016) and Fallan (2016) also apply this analysis to identify environmental disclosure. PROPER is derived from companies' ratings in managing environment consisting of five levels; gold, green, blue, red and black, with gold as the highest-level scoring 5 and black as the lowest one scoring 1 (KEMENLHK, 2015). ROA is a profitability ratio by dividing net income with total assets, while DAR is ratio that indicates the proportion of a company's total debt to its total assets. Board size is derived from the number of the board of commissioners, while company size is measured by total assets of the company. From the model developed

in the previous literature review, this research holds one exogenous variable (Company Size) while the other six are endogenous.

Data Analysis

This study employs three data analyses *i.e.* descriptive, correlation and path. Descriptive analysis aims to describe research variables, while correlation one intends to identify the correlation among variables in the model. Correlation analysis portrays an association between two analyzed variables without any interference from the correlation of any other variables. Lastly, Path analysis is put into use when identifying both simultaneous and sequential causal relationships of several variables in the model (Yanto et al., 2016).

To measure the fitness of the theoretical model, this study employs goodness of fit and normality tests. The latter is applied in each variable using kurtosis coefficient and critical ratio (c.r.) of multivariate analysis. Byrne (2009) states that the threshold of a kurtosis coefficient shall not be more than 10.00, while that of multivariate c.r. should be 2.58 at the maximum. If this research does not meet normality requirement, it may do some checking on Mahalanobis distance (Byrne, 2009) or do some bootstrapping technique as suggested by Bollen and Stine (1992).

RESULTS AND DISCUSSION

Descriptive Analysis

Descriptive analysis shows that the average CED of manufacturing companies in Indonesia is around 0.24 with the highest score of 0.72. The lowest score is 0.11 and the value of standard deviation is 0.15. This also means that the average of CED is about 24% with the highest CED is 72%. This mean shows that CED among Indonesian manufacturing companies is still considered low. Moreover, most of them receive blue PROPER rating (75%), 18% red, 4.25% gold and 2.83% green. The analysis reveals that the average rating of the companies is 2.93 (nearly blue), with black as the lowest (score 1) and gold as the highest (score 5). The following table provides the complete details.

Table 1: Summary of descriptive analysis

Variable	Minimum	Maximum	Mean	Std. Deviation
Size	4.84	19.34	13.98	3.80
ROA	-0.15	0.72	0.08	0.11
DAR	0.07	1.21	0.44	0.20
Board Size	2.00	12.00	4.90	2.06
Proper	2.00	5.00	2.93	0.61
CED	0.11	0.72	0.24	0.15

Correlation Analysis

CED is closely related to three variables; PROPER (0.440, $p<0.01$), Board Size (0.414, $p<0.01$) and Company Size (0.326, $p<0.01$). This analysis reveals that ROA

has no correlation with CED (0.152, $p>0.05$), nor does DER (-0.209, $p>0.05$). However, ROA significantly correlates with PROPER (0.214, $p< 0.01$) and Company Size (0.205, $p<0.05$). PROPER have significant correlation with ROA (0.214, $p<0.01$) and Board Size (0.245, $p<0.01$), yet Size and DAR does not correlate with PROPER. The interesting issue from this analysis is that DAR does not correlate with other variables of in the model. For more information, Table 2 displays the correlation matrix of variables in this study.

Table 2: Correlation matrix

Variable	Size	ROA	DAR	Board Size	Proper	CED
Size	1					
ROA	.205*	1				
DAR	0.119	0.042	1			
Board Size	.424**	-0.012	-0.024	1		
Proper	0.138	.214**	0.004	.245**	1	
CED	.326**	0.152	-0.099	.414**	.440**	1

Path Analysis

Path analysis shows that CED is significantly affected by two variables; PROPER and Board Size with beta coefficients of 0.342 ($p<0.001$) and 0.328 ($p<0.001$) respectively. Both ROA and DAR does not affect CED with coefficients of estimate respectively 0.087 ($p=0.224$) and -0.096 ($p=0.168$). As a significant intervening variable in this study, PROPER is affected by both ROA (0.219, $p=0.006$) and Board Size (0.253, $p=0.004$). DAR and Company Size (Ln Size) do not significantly affect PROPER with beta coefficient respectively 0.002 ($p=0.976$) and -0,015 ($p=0.868$). Company Size as the exogenous variable significantly affects Board Size (0.424, $p<0.001$) and ROA with standardized estimate of 0.205 ($p=0.012$). However, Company Size does not affect DAR with beta coefficient of 0.119 ($p=0.151$). Table 3 displays more detailed data.

Table 3: Results of path analysis

Hypothesis	Variable			Estimate	p-value	Remark
H_1	CED	<---	Proper	0.342	***	Accepted
H_2	Proper	<---	BoardSize	0.253	0.004	Accepted
H_3	CED	<---	BoardSize	0.328	***	Accepted
H_4	Proper	<---	ROA	0.219	0.006	Accepted
H_5	CED	<---	ROA	0.087	0.224	Accepted
H_6	CED	<---	DAR	-0.096	0.168	Rejected
H_7	Proper	<---	DAR	0.002	0.976	Accepted
H_8	BoardSize	<---	LnSize	0.424	***	Accepted
H_9	ROA	<---	LnSize	0.205	0.012	Accepted
H_{10}	DAR	<---	LnSize	0.119	0.151	Rejected
H_{11}	Proper	<---	LnSize	-0.015	0.868	Rejected

Note: *** significant at the 0.001 level

Hypothesis Testing

As mentioned in the literature review, this study suggests eleven hypotheses, eight of which (H_1, H_2, H_3, H_4, H_5, H_7, H_8 and H_9) are accepted, and three of which (H_6, H_{10} and H_{11}) are rejected. All of the accepted hypotheses have convincing magnitude of beta coefficients and the level of significance. Two of the accepted hypotheses, H_5 and H_7, are null hypotheses. Likewise, the rejected ones also have convincing p coefficient. Hence, the acceptance and the rejection of the hypotheses are not in gray areas or having improbable magnitude. To gain a better understanding, the testing is visualized Figure 2.
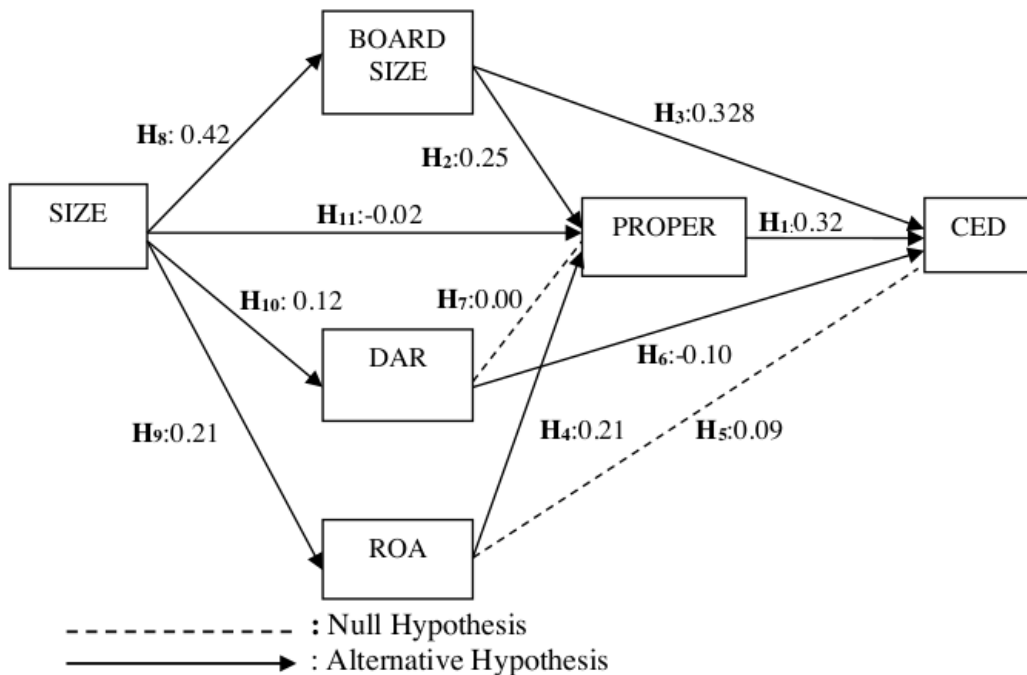
Figure 2: Model for improving carbon emission disclosure

Goodness of Fit Test

Multivariate normality analysis indicates that the distribution of ROA has kurtosis coefficient of 10.37 exceeding the coefficient of 10 as a maximum value. Multivariate kurtosis shows the number of 32.38 with 19.83 of c.r. indicates that multivariate data distribution is not normal. To overcome this issue, this study conducted 2,000 bootstrapping in performing path analysis. The result of the analysis shows that Bollen-Stine bootstrap p is 0.255 ($p>0.05$) which means that path analysis can still be carried out.

This study applies seven indices to examine the goodness of fit *i.e.* CMIN, CMIN/d.f., GFI, AGFI, NFI, CFI and RMESEA (Yanto et al., 2016). The results of analysis point out that all indices display satisfying coefficients. In other words, the model developed for this study has met the fit requirements. Table 4 presents further information on all indexes of goodness of fit.

Table 4: Goodness of fit

Index	Cut-off	Result	Remark
CMIN	Insignificant	0.112	Fit
CMIN/d.f.	< 2.0	1.921	Fit
GFI	> 0.9	0.983	Fit
AGFI	> 0.9	0.910	Fit
NFI	> 0.9	0.932	Fit
CFI	> 0.9	0.963	Fit
RMSEA	< 0.08	0.080	Fit

DISCUSSION

To deal with pressures put by both government and society, it is essential for firms to provide information on environmental management, especially carbon emissions. Those implementing PROPER well would have adequate information on environmental management. The effect of PROPER rating on CED proves this. This finding is in accord with studies conducted by Dawkins and Fraas (2011) and Al-Tuwaijri et al. (2004). However, Akhiroh and Kiswanto (2016) conclude that environmental performance does not affect CED. The reason of different findings is probably due to the differences of financial statement periods and different subjective perceptions in interpreting financial reports. Hence, companies with good PROPER implementation would have more advantages in facing both governmental and social pressures.

   Another variable affecting the CED of manufacturing companies is Board Size. Those with more boards of commissioner members tend to broadly publish CED. As a reflection of GCG implementation, Board of Commissioner encourages companies to enhance transparent, accountable, responsible, independent and fair management (KNKG, 2006). Research conducted by Rankin et al. (2011), Saragih et al. (2013) and Liao et al. (2015) confirm this finding. Board Size also affects companies' environmental performance. Doonan et al. (2005) contend that environmental performance is affected by the availability of human resources, finance and management. The board of commissioners may represent the availability of both human resources and management. Board size, as a proxy of the implementation of GCG, affects not only environmental performance but also significantly influence CED. It also means that board of commissioners encourages management to disclose more information about carbon emission of the company.

   Leverage measured by DAR affects neither environmental performance nor CED. Simply put, environmental performance and CED are not affected by the amount of interest that companies should bear. The study does not encounter an idea that the company with higher leverage tends to have lower environmental performance. Thus, companies' expenditure on producing environmental information is not affected by their interest expense. The finding is similar to the previous one gained from studies conducted by Bae Choi et al. (2013) suggesting that leverage does not affect CED. Nevertheless, Belkaoui and Karpik (1989) find that leverage positively correlates with social information disclosure. On the other hand, a study on mining companies uncovers a fact that leverage offers positive effects on environmental disclosure (Yanto and Muzzammil, 2016). It is likely for

the samples of the study to be the cause of distinct findings, for mining companies are prone to trigger higher natural degradation than those from other sectors.

The study finds that leverage does not affect environmental performance. Supiyanto and Pratiwi (2017) confirm this finding. Even though, the expense of environmental management is considerably expensive (Hutchison, 2011), but the amount seems to be unaffected by companies' liability. Law enforcement on environmental protection could cause the insignificant correlation between company liabilities and environmental performance. Based on Law No. 32/2009, it is likely for the implementation of PROPER to be mandatory, so the cost of environmental management is not affected by companies' interest expense. Moreover, government and Indonesia Chartered Accountant (IAI) could not force the companies to disclose carbon emissions in their annual reports as it is still considered voluntary (Kusuma, Manurung, Oktari, and Hasnatarina, 2016).

Profitability proxied by ROA significantly affects PROPER rating. Findings of prior studies conducted by Bae Choi et al. (2013) and Rankin et al. (2011) are in accord with this. Nevertheless, some previous studies conclude otherwise (Kusuma, Manurung, Oktari, and Hasnatarina, 2016); Yusoff et al., 2013). Moreover, Doonan et al. (2005) conclude that environmental performance is affected by several factors, among which are finance and human resources. ROA, as the proxy of profitability—though not depicting the entire companies' financial performance—strongly affects environmental performance, yet profitability does not affect CED. This study also provides information that in the short term, profitability influences environmental performance as contended by Kim (2015). Insignificant effect of profitability on CED could be a result from two factors. First, it is voluntary to record CED in annual reports (Kusuma, Manurung, Oktari, and Hasnatarina, 2016), so companies do not have to publish the entire information of carbon emissions. Second, the samples of this study are all kinds of manufacturing industries whose activities induce distinct effects on environment. Therefore, CED depends on the companies' sectors. For example, a study conducted by Yanto and Muzzammil (2016) concludes that profitability negatively affects environmental reporting.

Size as the proxy of assets and economy of scale has various effects on leverage, environmental performance, profitability and board size. This study reveals that there is no tendency for larger companies to perform better environmental performance. The ownership of assets and economy of scale do not guarantee better implementation of environmental management. Another factor affecting environmental performance according to Doonan et al. (2005) is human resources and the willingness of the management to implement environmental accounting. This proves that board size significantly affects environmental performance.

Company size significantly affects board size, which means that the larger the companies are, the more the boards of the commissioners they will have. Dang and Li (2014) on their study confirm this finding with the same result. This is quite reasonable as a larger company tends to have more matters to handle. Besides, a larger company would have more financial resources to pay the board of the commissioners. This finding may contribute to fill in the gap of limited studies on the relationship between company size and board size in Indonesian manufacturing companies.

The analysis reveals that company size has positive effects on leverage. In other words, larger companies tend to have higher leverage for some reasons. First, they

are likely to possess better cash flow than smaller ones which enables them to gain cash whenever they have financial pressure (Shuetrim et al., 1993). Second, they hold low information asymmetry enabling them to obtain additional liability more easily (Brierley, 2005). Third, they have bigger chances to gain trust from others willing to invest in their companies (Ezeoha, 2008).

Doğan (2013) and Dang and Li (2014) also discover that company size affects profitability. In this case, larger companies tend to gain higher profits. This finding is quite logical as larger companies are likely to own higher economy of scale, so they can reduce cost of production. However, a study conducted in mining companies offers different finding suggesting that company size negatively affects profitability (Yanto and Muzzammil, 2016).

It is inevitable that economic growth needs fuel consumption that leads to the increase of carbon emissions (Arouri et al., 2014; Odhiambo, 2012). Amid the fast-growing of carbon emissions in global scale, Indonesia has a significant contribution to the emissions (Oliver et al., 2013). Therefore, the government of Indonesia has attempted to decrease carbon emissions by 26% in 2030 (Goldenberg, 2015). Then again, this target cannot be achieved without participation from all parties, such as government, society, and industry. Law enforcement to strengthen PROPER implementation in each manufacturing company is one of effective strategies to control carbon emmissions and to improve companies' transparency in managing environment. For example, in 2015 PROPER decreased carbon emissions produced from firms as many as 38.9 million tons (KEMENKLH, 2015). Nevertheless, Arouri et al. (2014) suggest that government should be careful in developing alternative energy sources.

There are several reasons for the importance of strengthening PROPER implementation. First, based on the results, the average of carbon emission disclosure among Indonesian manufacturing companies still is around 24%. In addition, up to now most of the companies (75%) gains only blue ratings while gold-rated companies are only about 4.2% (KEMENLHK, 2015). Even though, government has also manifested this program in the Law of the Republic Indonesia No 32 of 2009 compelling all firms to actively engage in environmental management, many companies have yet implemented PROPER. Therefore, strengthening the implementation of this program would contribute a lot to control carbon emissions from manufacturing companies in the country.

Second, good PROPER implementation would benefit companies. The companies would be able to cope with pressures from society, market, stockholders, and international community (Gonzalez-Gonzalez and Ramirez, 2016; Liesen et al., 2015), because the company's operations are already environment friendly. As a result, companies would be granted legitimacy from society (Dowling and Pfeffer, 1975; O'Donovan, 2002). Strong PROPER implementation would enable companies to deal with governmental pressure related to compliance with Law No. 32 of 2009.

Third, today the people of Indonesia have become more aware of environmental issues (Genoveva, 2016) that they are in high demand of green products (Handriana, 2016). By implementing PROPER properly, the company would get reward from society by receiving higher firm's value (Saka and Oshika, 2014). Therefore, bettering PROPER implementation and broadly reporting carbon emissions in

financial statements would serve as inexpensive advertising in promoting companies' brand image.

Fourth, mandatory on environmental disclosure is not strong enough. Law enactment requiring companies to include environmental reports in annual reports has not had a significant impact on environmental disclosure (Costa and Agostini, 2016; Fallan, 2016). Likewise, Freedman and Park (2014) also find that the impact of climate change disclosure mandate in the US has yet reached satisfactory results. Therefore, mandating environmental disclosure is not strong enough to encourage companies to disclose more environmental information. Government pressure in the form of PROPER implementation becomes more pivotal in controlling companies' carbon emissions as well as increasing companies' CED.

In relation to CED, two policies need to be synchronized *i.e.* companies' mandatory to participate in PROPER and voluntary to disclose carbon emission. The government and IAI are required to compel companies to disclose their environmental reports including carbon emission report. Same as suggested by Li et al. (2017) that environmental disclosure should be mandatory for Chinese companies. This is essential to encourage them to be more transparent, accountable, and responsible in managing environment.

CONCLUDING COMMENTS

Although PROPER is mandatory to be applied in Indonesian manufacturing companies, most of companies (75%) gains blue ratings with average Carbon Emission Disclosure reaches only 24%. CED on manufacturing companies is affected by environmental performance (PROPER rating) and board size, but leverage and profitability do not impact on CED. Environmental performance is affected by board size and profitability, while company size and leverage do not have significant effects on environmental performance. The insignificant effect of leverage and ROA on CED is likely to be caused by the fact that CED is voluntary, so companies with low CED reporting would not get any penalty.

Carbon emissions from economic activities in Indonesia keep increasing gradually over years. To reduce carbon emissions, Indonesian government and all manufacturing companies should strengthen the implementation of PROPER. This will lead to positive impacts on the companies and environment, such as carbon emission control, less governmental and social pressures, and the promotion companies' brand image.

The implementation of PROPER has already been mandatory despite many companies has yet implemented it, so policies on environmental reporting and carbon emissions should be mandatory as well. The government and IAI are required to compel all companies to publish their environmental management in their annual reports as an act of responsibility towards society, stockholders and government. The study concludes that strengthening the implementation of PROPER could improve manufacturing companies' performance in managing environment. The program is considered effective in increasing CED in annual reports by Indonesian manufacturing companies. PROPER is one of the new hopes for reducing carbon emissions that are continuously increasing from the country. Further studies are required to investigate the impacts of CED on firms' value.

LIMITATION OF THE RESEARCH

This study only measures the breadth of carbon emissions disclosed in annual reports and does not measure the actual amount of carbon released to the atmosphere due to companies' operation. Research to identify financial and human resources factors influencing actual carbon emissions needs to be conducted immediately.

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