

Environmental Performance, Carbon Emission Disclosure and their Relationship to Share Return: An Indonesian Perspective

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This study aims to analyse the relationship between environmental performance and carbon emission disclosure to share returns. To test our hypotheses, we used 130 firm-year observations taken from manufacture firms listed on the Indonesian Stock Exchange that included a PROPER assessment on the 4 – year period between 2013 and 2016. The results show that environmental performance does not have a relationship to share return, while carbon emission disclosure has a positive relationship to share return. These results indicate that, in general, the market will respond to information as a particular signal toward an event that affects the firm's value. This was reflected by the firm's share price. This study crucially informs investors to consider non-financial factors such as corporate social responsibility disclosure and environmental performance in the context of selecting a 'proper' investment.

Key words: *Environmental performance, carbon emission disclosure, share return saham, Proper.*

Introduction

Ideally, a firm aims to gain maximum profit in order to maintain its 'sustainability'. A firm's sustainability (economic, social, and environmental) will be maintained if the firm paid serious attention to the social and environmental dimension as well as the economic (McWilliams & Siegel, 2001; Nasih et al., 2019). Nowadays, management is not only profit-oriented. They also need to fulfill the stakeholder group's expectations in relation to the firm's sustainability (Irawati et al., 2019; Lubis et al., 2017; Ekawaty, 2019). According to Ernst & Young's 2013 report, 40% of shareholder proposals had social and environmental themes. This phenomenon shows that shareholders are increasingly putting pressure on the

firm to have more concern for sustainability development issues including but not limited to the environment. This new shape shifts a firm's paradigm from a single bottom line (economic) to a triple bottom line (economic, social, and environmental sustainability). A firm's value and growth has shifted from its economic growth to the triple bottom line and will be reflected from an economic, social, and environmental dimension.

The increase in society's awareness of a firm's economic activities and how they impact people, planet, and profit, is causing the birth of 'green accounting'. Applying this concept shows that a firm is committed to and aware that development focussing only on economic growth will halt sustainability progress (Dewi, 20120). To prevent the immense economic loss, the United Nations Framework Convention on Climate Change (UNFCCC) developed an international amendment known as the Kyoto Protocol. Kyoto Protocol is an international agreement that derives from the United Nations Framework Convention on Climate Change. If successfully implemented, the Kyoto Protocol will be able to decrease global temperatures by 0.020°C up to 0.280°C in the year 2050. The Kyoto Protocol is targetting six greenhouse gases – CO₂, CH₄, N₂O, SF₆, PFC, and HC – to decline (Jannah & Muid, 2014). The Kyoto Protocol aims to regulate three mechanisms to decrease emissions named the Clean Development Mechanism (CDM), Joint Implementation (JI), and Emission Trading (UNFCCC, 1998) Kyoto Protocol ratification gives benefits to Indonesia to reaffirm the shared responsibility to implement sustainability development (Nasih et al., 2019).

As one of the countries that has agreed to and signed the Kyoto Protocol, Indonesia ratified the Kyoto Protocol on June, 28th 2004, through Law No. 17 Year 2004 in the context of implementing sustainability development and participating in decreasing global greenhouse gas emissions. Indonesia's government also made several regulations and laws to minimise their negative impact on the natural environment. The laws, as follows first, is Law No. 23 Year 1997 about natural environment management, and the second is Government Regulation No. 27 Year 1999, state that the government is compulsory to create an analysis of natural environment impact on each project to minimise carbon emission impacts. These laws have resulted in firms implementing the Clean Development Mechanism (CDM) as a firm's standard operating procedures. The aim is to reduce carbon emissions that are generated from a firm's operational performance (Ratnatunga & Balachandran, 2009), and develop its environmental performance (Suratno et al., 2007; Retno & Priantinah, 2012).

One effort being made toward sustainable development is to conduct carbon emission disclosures as a way for accountants to tend treatment on environmental issues. An attempt was made to manage the carbon generated from a firm's operational outputs and reported in each annual report. With the disclosure of this information, the firm show to the public that they already implement various strategies and methods to minimise carbon emissions. Carbon emission disclosure has become a vital part of corporate social responsibility (CSR) reporting

(KPMG, 2008; Syafaruddin, 2019). More than 70% of Fortune 500 firms voluntarily disclose their carbon emissions information to help and encourage other firms to implement carbon accounting activities (Barros et al., 2011; Ramadhani, 2015; Bae Choi et al., 2013). By disclosing social and environmental performances voluntarily, the firm will receive sustainable economic benefits (Isnalita & Narsa, 2012; Widiyanti et al., 2019). Barus and Maksum (2011) state that CSR information disclosure has a significant and positive relationship to share abnormal returns. Harymawan et al. (2019) also explain that additional information disclosed by the firm will make share price changes.

This study aims to examine the relationship between environmental performance and carbon emission disclosure to share returns. We used 130 firm-year observations, from manufacture - listed firms on the Indonesian Stock Exchange that included the PROPER assessment developed by Indonesia's Ministry of Environmental from the 4-year period 2013 to 2016. We selected the firms that included the PROPER assessment as these firms intensively generate carbon emissions from their operational outputs.

The study result shows that environmental performance does not have a relationship to share return, while carbon emission disclosure has a positive and significant relationship to share return. These results imply that, in general, the market will respond to information as a signal of a particular event that affects the firm's value, which represented as a firm's share price. Nevertheless, related to environmental performance, the investor does not put serious concern on environmental performance assessment as it does not directly affect the firm's financial performance in the short term. This study provides vital information for the investor to keep considering non-financial factors such as corporate social responsibility disclosure and environmental performance to select proper investment. Besides that, this study enriches the current literature on the importance of carbon emission to generate an investment return.

The rest of this paper will be organised as follows: Section 2 contains an explanation of the research hypotheses development; Section 3 explains the research variable, sample and regression model; Section 4 discusses the empirical analysis and hypothesis test; and Section 5 is a concluding remark, including a suggestion for future studies.

Literature Review

Mounting studies relate to a firm's social and environmental performance disclosure based on stakeholder theory – that the firm is pressured to balance the fulfillment of various stakeholder wants. According to stakeholder theory, a firm is not an entity that only operates for its own interest. Instead, it exists to provide benefits to its stakeholders (shareholder, creditor, consumer, supplier, government, society, analyst, and other parties). Thus, the existence of the firm depends on the stakeholder's support (Ghozali & Chariri, 2007). Furthermore, the

disclosure of corporate social responsibility is understood as an act to gain legitimacy from local communities and maximize firm financial performance in the long term (Berthelot & Robert, 2011). Environmental performance disclosure that is voluntarily implemented becomes a signal for the investor that, in the end, will increase the firm's value. This phenomenon is in line with signaling theory, which states that information is a signal that announces via management to the public where the firm has a promising prospect (Miller & Plott, 1985). As a result, more forecasting predicts that returns will rise and providing information gives a signal to stakeholders about the firm's future both in the short and long term, which forecasts an increase in the long-term earnings.

Prior studies found that there is a positive relationship between greenhouse gas emission disclosure and environmental performance toward a firm's value (Matsumura et al., 2013; Clarkson et al., 2011). Based on this research result, it can be concluded that the market positively responds to management effort to disclose greenhouse gas emissions. This phenomenon occurs, as investors perceive management can manage the environmental damage from its business operational activities (Griffin et al., 2012). Using greenhouse gas emission information (one of environmental analysis component of the firm) in a firm's report, means related parties that have an interest can understand how regulation, value, and motivation in the firm is taking place to deal with greenhouse gas emissions and their natural environment issues (Ahmad & Hossain, 2015). This creates a value for the firm.

Hsu and Wang (2013) argue that investors do not agree with the business entity receiving allowances for dealing with global warming issues. This disagreement has investors worried that those allowances have more costs attached compared to return. In other words, the greenhouse gas emission information is costly. Furthermore, a prior study found that the public are more sensitive to information that contains "bad news." As a result, investors do not have any interest in information on climate changes caused directly by the firm. These perceptions rise if the firm discloses that their business' operational activities are causing massive greenhouse gas emissions. As that information spreads to society the firm develops a deprived image. In the end, it will lead to a downfall of sales and share prices.

Hansen and Mowen (2005) states that environmental performance should not be perceived as philanthropy, instead, as competitiveness. An ideal environmental performance will generate eco-efficiency that supports the firm's sustainability development. Decent sustainability will attract the investors to invest as it has minimized risk and future return that always rises. The test of the social aspect by Al-Tuwaijri et al. (2004) shows that there is a positive relationship between environmental performance to financial performance. Thus, we hypothesised that:

H1. There is relationship between environmental performance and share return

Besides that, the firm that discloses its environmental activity appropriately will provide information that is reliable for various stakeholders. The high quality of disclosure by the firm is a positive signal from the firm to stakeholders and shareholders. Nurdin and Cahyandito (2006) state that an investor's belief is a vital aspect of the capital market. Hence, an announcement or disclosure will lead to investors reacting with various responses. If the investor's response is homogeny, then there will be no reaction; therefore, there is no transaction. Based on the above explanation, we hypothesised that:

H2. There is relationship between carbon emission disclosure to share return

Research Methodology

Sample and Data Sources

In this study, we used manufacture-listed firms and included in the PROPER assessment developed by Indonesia's Ministry of Environmental from 2013 to 2016. We use manufacture firms as they have more amount of industry compared to other sectors. The data sources of this study are the annual report and financial report of the firm that were obtained from the Indonesian Stock Exchange (IDX) official website and the PROPER assessment rank were obtained from the Ministry of Environmental's official website. This study implemented purposive sampling methods to select the research sample. The selection criteria that this study employed is as follows:

Table 1: Research Sample

No	Criteria	Year				Total
		2013	2014	2015	2016	
1	Manufacture firms that listed in IDX	136	141	143	144	564
2	Manufacture firms that not participating in PROPER	(99)	(104)	(106)	(107)	(416)
3	Participants of PROPER that the data is not complete and invalid	(3)	(5)	(8)	(2)	(18)
	Total firm-year observations	34	32	29	35	130

Variable Operationalization

Share Return

The dependent variable of this study is the share return or also known as share earnings and measured by the changes of share price between period t and t-1 (Halim, 2005). As the share price changes, it will generate higher share return. Tandellin (2010) explains that share return

is one factor that motivates investors to invest and also acts as compensation for the risk borne by investors as they decided to invest. In this study, the share return formula is as follows:

$$Ret_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Where, Ret_t is share return on period t , and P_t is share price on observation period, while P_{t-1} is share price of previous period.

Environmental Performance

To test our first hypothesis, we used environmental performance as our independent variable. The environmental performance was measured by ranks given by Indonesia's Ministry of Environmental that regulated by PROPER, which is the Ministry of Environmental Law No. 5 Year 2011 about the assessment criteria and PROPER rank. The detailed environment performance assessment rank is provided in Table 2.

Table 2: PROPER Assessment Rank

PROPER Rank	Score/Point
Gold	5
Green	4
Blue	3
Red	2
Black	1

Carbon Emission Disclosure

The independent variable used to test the second hypothesis is carbon emission disclosure. This variable is regarded as any disclosing activity by the firm that let the community know the seriousness of the firm in the context of their responsibility and activities in relation to carbon emissions (Andrew & Cortese, 2011). Carbon emission disclosure was using five main indicators developed by Carbon Development Program (CDP). This assessment of carbon emission disclosure explained the detail of five indicators through 18 items. Table 3 provides the checklists of carbon emission disclosure.

Table 3: Checklist Carbon Emission Disclosure Information

Category	Item
1. Climate Change (CC): Risk and Opportunity	CC1: Valuation / Description of risk (regulation, both of specific and general) that relates to climate change and action already or will be done as risk management effort.
	CC2: Valuation / Description of financial, business, and opportunity implication on climate change both in present and future.
2. Greenhouse Gasses (GHG):	GHG1: Describing method that applied to calculate greenhouse gas emission (GHG)
	GHG2: External verification on sustainability of greenhouse gas emission quantity (GHG)
	GHG3: Total greenhouse gas emission - metric ton CO ₂ – that generated
	GHG4: Disclosure of point 1, 2, and 3 directly on greenhouse gas emission.
	GHG5: Disclosure of greenhouse gas emission that generated from power sources (such as electricity, coal, and others).
	GHG6: Disclosure of greenhouse gas emission that generated from facility or segment level.
	GHG7: Comparison of current year greenhouse gas emission with previous years.
3. Energy Consumption (EC)	EC1: total energy consumed (such as terra joule, peta joule)
	EC2: Quantity of energy used that generated from renewable resources
	EC3: Disclosure based on its type, facility or segment
4. Reduction Cost (RC)	RC1: Explain the planning or strategy to minimize greenhouse gas emission
	RC2: Specification of minimization level of greenhouse gas emission and its target for each year
	RC3: Total cost of minimizing the greenhouse gas emission or the total allowances
	RC4: Future cost of emission that included in capital planning
5. Accountability Carbon Cost (ACC)	ACC1: Indication where particular committees (or executives) has responsibility to activity that relates to climate change
	ACC2: Describe the mechanism that created by boards (or other executives) by reviewing the sustainability of the firm in process of climate change.

In this study, greenhouse gas emission was proxied by the carbon emission disclosure index (Bae Choi et al., 2013). The valuation base of that disclosure index is a regulation developed by Carbon Disclosure Project (CDP), an organisation from the United Kingdom that focussed on a firm's emission disclosure in relation to activities triggering global warming. The formula of this disclosure index is as follows:

$$CED = \frac{\text{Total score of entity } i \text{ for period } t}{\text{Total maximum score}} \times 100\%$$

Methods

This study uses ordinary least square regression analysis by SPSS 22 to test the relationship between environmental performance and carbon emission disclosure to share return. We test the hypotheses after the research data fulfil all the classic assumption requirement. The classic assumptions test is needed so that the result can be interpreted appropriately. The regression equation of this study as it follows:

$$Ret_{it} = \alpha + \beta_1 Epi_{t-1} + \beta_2 CEDi_{t-1} + e_{it-1} \quad (1)$$

Where, Ret_{it} is share return current period, Epi_{t-1} is environmental performance of previous period and $CEDi_{t-1}$ is carbon emission disclosure of previous period.

Result and Discussion

Descriptive Statistic

Table 4 provides a descriptive statistic result of this study. This study uses 130 firm-year observations as its sample. The result shows that share return in this study has an average value 0.008838 with standard deviation, which represents the share return variable variety is 0.3447852. Next, the average carbon emission disclosure in this study is 40.82%, with a standard deviation 23.71%. Besides that, the least carbon emission disclosure of the firm is 11.11% or approximately only discloses two items of carbon emission disclosure for each year, and the utmost amount is 88.89%. This result means that a firm discloses 16 items of carbon emission for each year based on the Carbon Development Program.

Table 4: Descriptive Statistic Test Result

	N	Minimum	Maximum	Mean	Std. Deviation
CED	130	0.1111	0.8889	0.408120	0.2371909
Ret	130	-0.7870	1.2913	0.008838	0.3447852

Table 5 provides a descriptive statistic for the only environmental performance variable. The result shows that total observations, which are 130 firm-year observation categorised into the firm who categorised gold rank according to PROPER, are five observations or only 3.8%. The rest is categorised as green rank is 16 observations or 12.3%, then blue rank is 95 observations or 73.1%, and the last is categorised as red rank with amount 14 observations or 10.8%.

Table 5: Descriptive Statistic – Environmental Performance

		Frequency	Percentage (%)
	Red	14	10.8
	Blue	95	73.1
	Green	16	12.3
	Gold	5	3.8
	Total	130	100.0

Classic Assumption Test

Before conducting the main analysis, we must ensure that the regression model is appropriate to analyse the environmental performance and carbon emission disclosure to share return. These classic assumption tests consist of four types of tests, which are the normality test, multicollinearity test, heteroskedasticity test, and autocorrelation test.

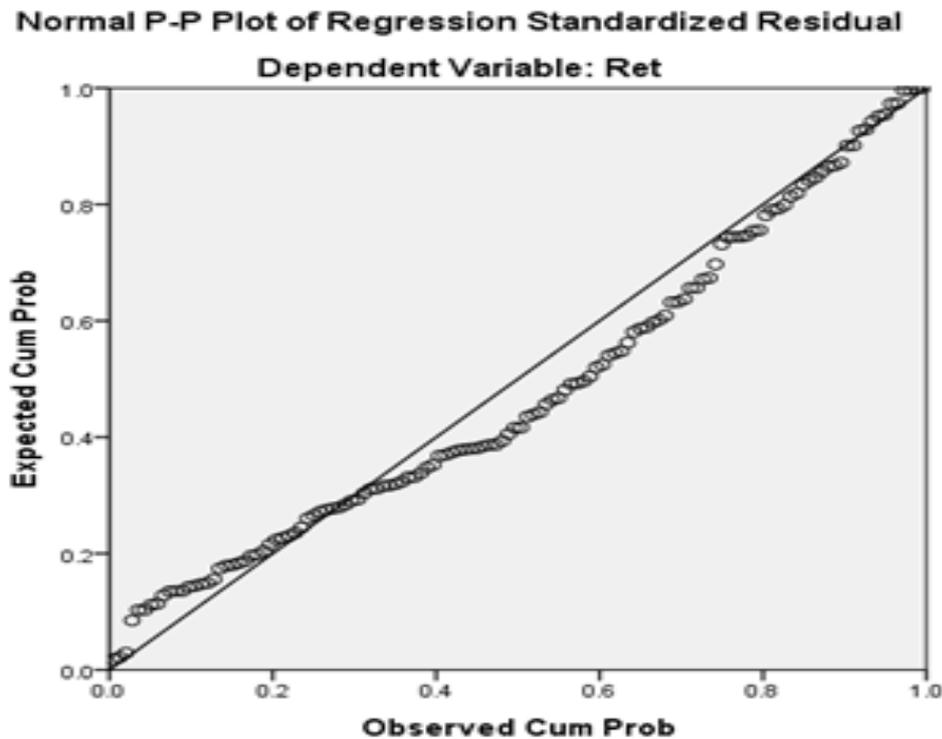
Normality Test

The normality test is a non-parametric test conducted by the Kolmogorov-Smirnov test. The significance (2-tailed) level of normally distributed data is more than 5%. Table 6 provides the Kolmogorov-Smirnov test result where obtained Kolmogorov-Smirnov value is 1.048, with a significance level is 0.222. The significance level is more than 0.05. This result concludes that the research data is normally distributed.

Table 6: Kolmogorov-Smirnov Test Result

	Unstandardized Residual
N	130
Kolmogorov-Smirnov Z	1.048
Asymp. Sig. (2-tailed)	0.222

Figure 1. Normal P-Plot Chart



As seen in Figure 1, the data spread is around and following the diagonal line. Therefore, based on the Normal P-Plot result, the research data is normally distributed, which is in line with the Kolmogorov-Smirnov test result.

Multicollinearity Test

A multicollinearity test is needed to test the regression model to see if there is any strong correlation between each independent variable. Determining that the regression model has a multicollinearity symptom is based on a tolerance value and the Variance Influence Factor (VIF). The regression model that unfettered from the multicollinearity issue is the regression model that has tolerance value ≥ 0.10 or if the Variance Influence Factor (VIF) value is ≤ 10 . Based on Table 7, it is shown that all independent variables, which are environmental performance (EP) and carbon emission disclosure (CED), have tolerance value > 0.1 and VIF < 10 . This result settles that all independent variables in this study do not have any multicollinearity symptoms.

Table 7: Multicollinearity Test Result

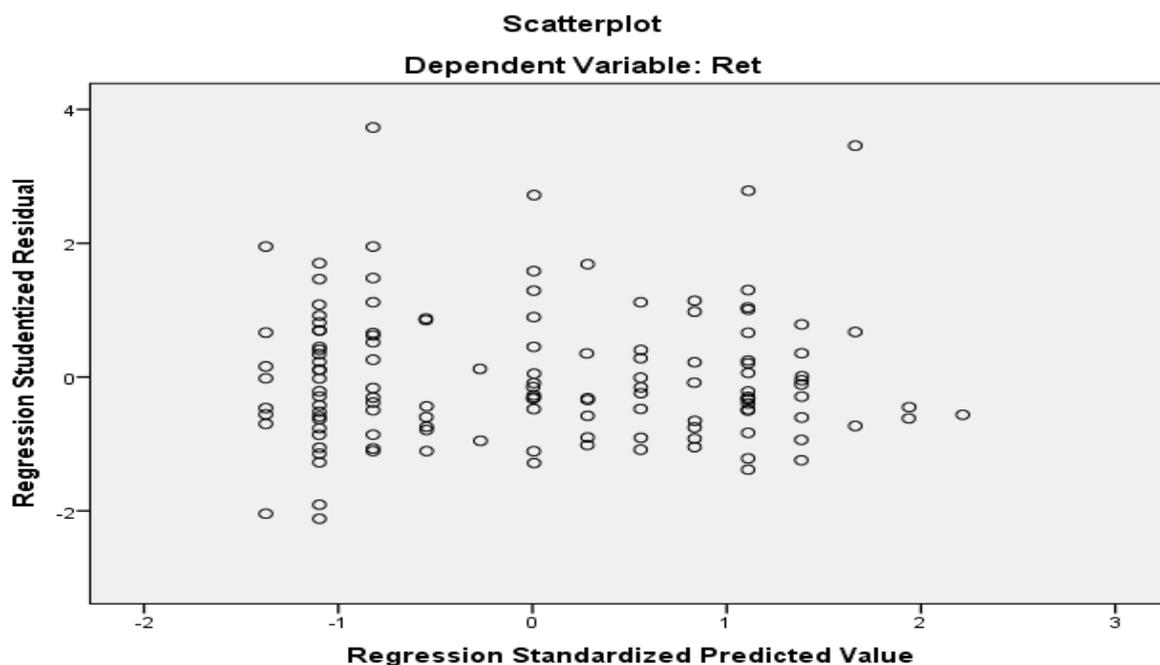
Variable	Collinearity Statistic		Description
	Tolerance	VIF	
EP	0.719	1.391	No multicollinearity issue
CED	0.719	1.391	No multicollinearity issue

Heteroskedasticity Test

A Heteroskedasticity test was conducted to figure out the relationship between other variables to independent variables. If there is a homoscedasticity symptom, then there is no relationship between other variables to independent variables; therefore, the dependent variable is only explained by independent variables. A Heteroskedasticity symptom test is achieved using a scatter plot test. If the dots are spread widely and do not shape a particular pattern, then the regression test does not have a heteroskedasticity assumption.

Based on Figure 2, the scatter plot diagram shows that the dots have spread widely, not huddled each other, and are not shaped in a particular pattern. This result settles that there is a homoscedasticity symptom, or there is no relationship between other variables to independent variables, which dependent variable only explained by independent variables. This test result shows that the regression model is free from a heteroskedasticity symptom.

Figure 2. Scatterplot Diagram



Autocorrelation Test

The autocorrelation test objective is to test if there is a relationship between error in the variable for period t with error in the same variable for period $t-1$ (previously). To ensure the autocorrelation issue, we use a Durbin-Watson test. As shown in Table 8, the regression model of this study has Durbin-Watson value 1.615 which still positioned in free from autocorrelation area as the limit is -2 to $+2$.

Table 8: Durbin – Watson Test

Model	Durbin – Watson
1	1,615

Main Analysis

Table 9: Regression Result

Variable	Regression Model		
	Coefficient	t	Sig
(constant)	0.116	0.745	0.457
EP	-0.086	-1.497	0.137
CED	0.384	2.592	0.011*
R square	0,050		
F statistic	3.369		
F Sig.	0.038		

*significant at level of 5%

Table 9 provide the ordinary least square regression analysis test result that test the relationship between independent variables which are environmental performance and carbon emission disclosure toward dependent variable which is share return. Based on the regression result provided in Table 9, the constant coefficient is 0.116, which means if all independent variables included in the regression model has zero value, then the value of share return is 0.116. The environmental performance variable has a regression coefficient -0.086, where if environmental performance's value increases one point, then the share return variable will decrease by 0.086 and vice versa, *ceteris paribus*. As for carbon emission, disclosure has a regression coefficient of 0.384. This value means that if carbon emission disclosure's value increase one point, then the share return will increase by 0.384, *ceteris paribus*.

The determinant coefficient (R²) indicates how much the percentage of all independent variables explain the dependent variable. The regression result provided in Table 9 shows that R² is 0.05 or 5%. This result implies that both environmental performance and carbon emission disclosure can explain the variation of share return by 5% and for the rest (95%) is explained by other variables that were not included in this study.

Relationship between Environmental Performance to Share Return

The regression result in Table 9 shows that the t value for the environmental performance (EP) variable is -1.497, with a significance level 0.137. As the significance level is higher than the requirement, which is 0.05, then it is concluded that environmental performance does not have a relationship to share return. The coefficient value has a negative value, which

means that if a firm has a better quality environmental performance, the firm's share return will be more unfavourable. This result confirms that the first hypothesis (H1) is not accepted.

Based on the analysis result on the regression test, the environmental performance does not have a relationship to share return. This result is consistent with Naratama and Majidah's (2014) research, which documents that environmental performance does not have a statistically significant relationship toward share return. This is in line with research conducted by Anggraeni (2015), which found empirical evidence that environmental performance does not have a relationship with the firm's value except for firms that have a gold rank. In this context, the share return is one indicator of the firm's value.

Therefore, as the environmental performance does not have any relationship with a firm's share return, it becomes an indication that investor is not considered to be paid attention to as an assessment of the firm's environmental performance. This investor's reaction to the assessment result does not directly link to a firm's short-term financial performance. Besides that, the Indonesian-listed firm's environmental management implementation are only following the minimum requirement of related regulations and laws. These habits are resulting in investors perceptions that there is no value-added both for the firm and the investors themselves.

Relationship between Carbon Emission Disclosure to Share Return

The t value for carbon emission disclosure (CED) is 2.592, with significance level 0.011, as provided in Table 9. The significance level is lower than 0.05. It can be concluded that the amount of carbon emission disclosure has a positive and significant relationship share return. This result confirms the second hypothesis of this study. As the item amount that describes the carbon emission is increased, it results in a higher firm's share return. This result is in line with legitimacy theory, which states that the firm that voluntarily provides environmental disclosure in its operational location has made a "social contract" with surrounding society. This action serves as one of the bases for the firm to obtain its legitimacy as the society has regarded the firm as already implementing its activity according to local norms and constraints.

The study result is in line with Matsumura et al. (2014), as they found a positive relationship between management decisions related to carbon emission disclosure and the firm's value. Barus and Maksum (2011) also argue that CSR information disclosure has a relationship to share return. These prior studies confirm that investors consider the firm's social aspect in the context of investment decisions.

Therefore, it can be said that the market, in general, responds to information as a signal for a particular event that affects the firm's value, which is represented by the firm's share price. According to Signaling Theory, the firm activities that provide information to investors about share return prospect is substantial. Information is considered as a "signal" - if that information is provided by management to society and conveys the firm has a promising future. As a result, more forecasting predicts that returns will rise and gives a signal about the firm's future both in the short and long term, which is used by an analyst to forecast the increase of the long-term earnings.

Conclusion

This study aims to examine the relationship between environmental performance and carbon emission disclosure to share returns. This study used manufacture-listed firms on the Indonesian Stock Exchange (IDX) and included in PROPER assessment by the Ministry of Environmental for the year-period 2013 to 2016. Based on the analysis result, the environmental performance does not have a relationship to share return. This result indicates that an investor is not considered to be paying attention to the assessment of the firm's environmental performance as the assessment results are not directly linked to the firm's short-term financial performance. As for the second hypothesis, this study found that carbon emission disclosure had a positive and significant relationship to share return. Therefore, it can be said that the market, in general, responds to information as a signal for a particular event that affects the firm's value directly, when represented by the firm's share price.

This study was limited in relation to the data source. The share return data used is only based on end-year share price. During the year is not considered due to its volatility. Consequently, this limitation provides an opportunity for future studies to extend the information related to the firm's share return data on a monthly or daily basis. This study provides vital implications for the investor to keep consider non-financial factors such as corporate social responsibility disclosure and environmental performance to select a proper investment. Besides that, this study provides consideration for Indonesia's firm in relation to the issue of global warming by intensifying the carbon emission disclosure in an annual or sustainable report. These actions can provide a decent public image and support the transparency of the firm to investors.

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