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# The Effect of Gas Emission Disclosure, Solid Waste Disclosure, and Effluent Disclosure on Firm Value

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## Abstract

The purpose of this study is to examine the relationship between the disclosure of waste information and the firm value in Indonesian's PROPER participant companies listed in Indonesia stock exchange. The waste information is examined by expanding waste components more specifically that is gas emission, solid waste, and liquid waste (effluent). The firm value is examined from an economic perspective by using the stock price. This research uses modified Ohlson valuation model with regression of panel data to analyze the PROPER participant companies listed in the Indonesia Stock Exchange during the years 2016-2018. To identify the waste information disclosure, this paper develops the quantified measurement based on content analysis from the company's Annual Report adopted from prior research. Consistent with the signaling theory, this research empirically generates findings that the disclosure of gas emission, solid waste, and effluent by the company, either together or separately, have a positive relationship towards the price of the company's stock. This shows that the market gives a positive reaction to companies that voluntarily disclose their waste information, so the waste information disclosure considered to be a "good news" for the company in the capital market.

**Keywords:** Firm value, Voluntary disclosure, Waste disclosure, Gas emission, Solid waste, Effluent

## Introduction

The public attention of the world community towards the issues of environmental sustainability and climate change is increasing significantly in the last decade, the business paradigm also extends. Companies are not only responsible for the management's welfare and the shareholder's wealth, but the company also responsible for social welfare and the environmental sustainability. It is integrated into a concept of corporate governance. One of the aspects of the corporate governance is the practice of the disclosure. Many companies in various sectors of industry in the whole country in the world, including Indonesia, have implemented practices disclosure of information related to corporate governance. This practice aims, one of them is, to protect the rights of shareholders to acquire relevant information of firm's management and the disclosure of information accurately and transparently related to the

performance of the company, ownership, and other related information to stakeholders (Kaihatu, 2006).

Lately, more companies are realizing the importance of the disclosure of information related to corporate governance practices in improving accountability and transparency. This is triggered by the emergence of various regulations that encourage the disclosure of these aspects. Through Regulations Number 25/2007 about the capital investment and Regulations Number 40/2007 about the limited company, the company is obligated to take charge of environmental sustainability as a form of commitment in developing a sustainable economy in Indonesia. In addition, related environmental accounting regulations in Indonesia have also been arranged in the in the statement of financial accounting standards (Pernyataan Standar Akuntansi Keuangan-PSAK) Number 32 about Forestry, PSAK Number 33 about general mining, and PSAK Number 57 about estimated liability, contingent liabilities, and contingent assets. In its application, to realize the practice of good corporate governance in Indonesia, the Government through the financial services authority (Otoritas Jasa Keuangan-OJK) have formulated regulation related to the disclosure activity by companies in ensuring the implementation of good corporate governance at publicly traded companies (Financial Services Authority of The Republik of Indonesia, 2015), and the disclosure of corporate responsibility reporting that published in the annual report of the company (Financial Services Authority of The Republik of Indonesia, 2016)

Environmental information is one of the aspects that is revealed in the Corporate Responsibility Reporting. The disclosure of environmental information by the company is believed to be one of the important factors in the concept of corporate sustainability. Environmental disclosure is provided as a form of transparency of information to demonstrate corporate social rights and obligations related to activities towards environmental sustainability.

Although environmental information is a voluntary disclosure, the responsibility of the disclosure of information is widely accepted by companies in the developing countries to declare a commitment to performance (Nor et al., 2016). So, until now, the disclosure of environmental information is already considered to be an essential part which is integrated to the company's performance reporting (Trireksani and Djajadikerta, 2016).

In the perspective of the agency theory, the disclosure activity is a method to reduce the existence of asymmetry information between managers and the stakeholders to prevent the problem of Agency, minimizing the gap of information, and increasing loyalty and obedience (Achmad et al., 2017). This also applies in terms of the corporate environmental information.

To identify and evaluate the environmental information, one of the main references is an index developed by *the Global Reporting Initiative* (GRI). A lot of research that examines the environmental information about related variables refer to the GRI index. According to Da Rosa et al. (2015), GRI index globally can be classified into three aspects, that is, the management aspects (such as regulations, policies, commitments, and audits), which covers the environmental aspects the company's environmental performance (such as utilization of natural resources, like water, energy, raw materials, and biological diversity) and the impact of corporate activities on the environment (gas emission, solid waste, and effluent), as well as the legal and financial aspects. Structure analysis for evaluating the level of disclosure of the impact of the company's activity on the environment are formulated by GRI include gas emission, solid waste, effluent, products, and services, as well as transportation (Da Rosa et al., 2015).

A report on corporate environmental information consisting of non-financial information that is mostly made up of voluntary disclosure. But the companies tend to have a paradigm of profit-oriented and cost analysis. Therefore, the companies likely will do the disclosure when it would benefit financially for them.

Although there has been a regulation surrounding the activity of the company, the level of disclosure company in Indonesia is still relatively low compared with other developing countries (Achmad et al., 2017). The company assessed the reluctant activities of disclosure to the maximum because the company still doubt that those activities will positively affect the firm value (Gunawan et al., 2009). As the study by Sarumpaet (2005) and Rahman et al. (2009) found that the disclosure of environmental information has no effect on the performance of financial the company.

Nevertheless, at the global level, several studies found a positive relationship between the disclosure of environmental information by the company and the decision of the investors to invest (Dhaliwal et al., 2011). It is believed it will push the market value of equity that reflected by the increase of the firm's stock price in the capital market. Similar with Dhaliwal et al. (2011), research by Klerk and Villiers (2012) and Wang (2015) found that environmental information disclosure effect significantly to the value of the shares of the company.

Earlier research focused more on the disclosure of environmental issues in General. While some specific environmental factors are less attention and require more thorough investigation, one of it is waste information. Some previous research related waste disclosure is dominated by the study of gas (greenhouse gas, gas emission, and carbon) only. This is caused by the issue of climate change is attracting most of the public community in the world, where one of the main factors was the effects of greenhouse gases produced by industrial activity (Van den Hove et al., 2002). Meanwhile, the study related to solid waste and the effluent information is still very limited, even though the solid waste and liquid waste company can also potentially environmental pollution that could also threaten life on Earth. One of the impacts appear is the threatening of the availability of clean water for human life quality due to contaminated by solid waste and effluent caused by industrial activity (Burritt and Christ, 2018). Related thereto, many companies have started to disclose the information of gas emission, solid waste, and effluent as a result of industrial activities to the public.

This study seeks to examine the disclosure of information about the quality of industrial waste the company more specifically. This research aims to empirically test the relationship between variables disclosure of gas emission, solid waste, and effluent the company in its Annual Reports and firm values. This research consists of several sections. The literature review, in the beginning, consisted of some of the theories that support the development of the concept of corporate governance, the disclosure in particular. This section also describes the literature related to the aspect of the disclosure of environmental information especially the waste information and firm value, as well as some findings from previous research that supports this research. The next part is the theoretical framework that attempts to build a hypothesis based on theory and literature that has been presented before. Research Methods section contains sample selection techniques and data. Results and Discussion section contains the results of the analysis of the regression model and findings of the results of hypothesis testing of the variables examined. Lastly, the Conclusion section contains summary as well as limitations in this research.

## Literature Review

### Agency Theory

The concept of Agency Theory emphasizes the relationship between identification of the shareholders of the company (the principal) and the management (Agent) to execute something based on the interests of the principals there including delegation of authority to the agent (Jensen and Meckling, 1976). In practice, the agent has the power to control the information associated with companies. Therefore, the agent has a duty to undertake the disclosure of corporate information to the principal as a form of accountability. The disclosure can reduce the occurrence of asymmetry information between the principal and the agent so as to prevent the problem of Agency (Achmad et al., 2017).

As it goes, then, the company pushed to have a responsibility not only to a shareholder, but also on all the stakeholders such as creditors, governments, and society (Tauringana and Chithambo, 2015). Therefore, the disclosure of information to the public, in line with the concept of agency theory, support the creation of trust between the principal and agent in an attempt to reduce the agency costs.

### Signaling Theory

Signaling theory states that companies disclose more information to give a positive signal to investors in capital markets (Wang and Hussainey, 2013). Using the assumption that manager has a more power to control the corporate information compared to the other party outside associated with the expectation of company sustainability, then the manager can improve the quality of the company's report revealed some information voluntarily to build a reputation (Healy and Palepu, 2001). Some research found that companies that disclose the environmental information in the annual report tend to have a reputation and a better financial benefit (Rahman et al., 2014).

In practice, the disclosure of environmental information that provided by the company sometimes does not reflect the reality. The company utilizes more disclosure activities to shape perceptions of stakeholders compared to their real efforts in reducing environmental pollution (Luo and Tang, 2014). Therefore, the accountable environmental information disclosure is very important to enhance the credibility and legitimacy of the company in the community.

### The Definition of Waste

In General, the waste has a wide interpretation, waste is the disposal caused by business activity that has been performed. The definition of waste according to Environmental Health legislation (Environmental Public Health Act – EPHA) is any item or substance that should be thrown out because of damaged, worn out, stale, or contaminated/rotten (Bai and Sutanto, 2002). While according to Regulation of Indonesian Government No. 101/2014, waste is defined as the rest of a business or activity which contain substances, energy, or other components due to the nature, concentration, and the numbers, either directly or indirectly, can pollute, ruin, and harm the environment, health, and the life of human beings and other creatures (Republic of Indonesia, 2014). Thus, it can be concluded that the waste disposal is the result of an activity that may pollute the environment so that it can threaten the life of the biodiversity found in the environment.

In General, the waste can be categorized into three classes (Bai and Sutanto, 2002):



1. Household Waste

Household waste is generated from the activities of the community in their lives every day. For example, household waste, markets, stores, restaurants, and so on.

2. Industrial Waste

Industrial waste is generated from industrial activities by the company.

3. Institutional Waste

Institutional waste is generated from operating activities of government institutions as well as other social institutions, such as schools, hospitals, and so on.

Along with the growth of human population, economic progress, supported by rapid industrial, as well as the high rates of urbanization affecting the increasing production of waste in most countries in the world especially in Asia region (Taweesan et al., 2016). Industrial and household sectors is the largest waste producers and keep increasing every year (Bai and Sutanto, 2002). However, this research does not include the household waste, the study only focused on industrial waste.

Industrial waste is a high-risk waste because most contain hazardous materials and toxic. Increased production of waste in the long term will give rise to adverse effects on the lives and the environment (Zainu and Songip, 2017). Research conducted by Huang and Chen (2015) classify industrial waste into three types, called the "Three Industrial Waste", i.e. solid waste, liquid waste (effluent), and gas emission.

The impact of each industrial waste potentially pollute the environment and harm human beings and the environment. The bad impact of industrial waste can be illustrated as follows, solid waste has contributions to environmental pollution through the landfill and the combustion process. The solid waste that piled on the landfill is potentially raising a range of seedling disease that will cause a variety of health problems. Meanwhile, the burning of solid waste will produce large quantities of materials harmful pollutants, such as Dioxins, Furans, Dust, Mercury, Arsenic, etc. (Hong et al., 2017).

Effluent also has a high risk of contamination to the environment. This liquid waste can contain a variety of heavy metals from the result of industrial activity, such as Sodium, Calcium, Magnesium, Sulfate, and other (Kadirvelu et al., 2001). This fluid can easily seep into the soil and contaminate the groundwater flow and other waters flow like a river and the sea, threatening the survival of biodiversity in the area that is contaminated.

In addition to solid waste and liquid waste, gas emissions generated by industrial activities is also very dangerous, because they contain dangerous elements, including the carbon and methane (Ahmad and Hossain, 2015) which can be accumulated to form greenhouse gases that spread in the atmosphere. The effects of greenhouse gases are then becoming one of the main causes of the occurrence of climate change globally.

Many countries that have concern for climate change seeks to find solutions together to minimize the acceleration of temperatures and prevent an adverse impact. Many of the deals that have been born this is concerns, such as, *The Kyoto Protocol*, *The Marrakesh Accords*, *The Bali Action Plan* and *The Paris Agreement*. One important thing that was agreed upon in the agreement was a joint effort for cleaning mechanism which is reflected by the low emission industrialization activity and the waste management (Directorate General of Climate Change Controlling of The Ministry of Environment and Forestry, 2016). Many countries have ratified the international consensus as a form of commitment to maintaining the sustainability of the

environment globally. These efforts are then revealed to the public as a form of corporate environmental responsibility.

### *The Disclosure of Waste*

The separation of the ownership and management on the company had potentially increased the occurrence of asymmetry information between managers and shareholders, where managers have the power to control the latest information related the condition of the company (Percy, 2000). one of the agency's effort to prevent it is by the disclosure of information from the management to shareholders of the company (Healy and Palepu, 2001). One of them is the disclosure of waste information by the company.

Along with the increased of the public attention on the issue of environmental sustainability encourages the creation of various environmental regulation for the industry especially about the waste management. Environmental regulation may increase the risk to the company's operating activities and will increase the additional costs for the company's cash flow (Al-Tuwaijri et al., 2004). Shareholders and potential investors of the company require information about the company's environment and the company's policy-related risks (Villiers and Van Staden, 2010).

The disclosure of waste information by the company as well as the corporate environment can impact economically for the company (Cormier et al., 2005). Empirically, shareholders and potential investors will react to waste information disclosed by the company both positive and negative related decision to invest at a time when published (Villiers and Van Staden, 2010).

Some previous research using the term carbon disclosure (Qian and Schaltegger, 2017) or disclosure of greenhouse gas emissions (Broadstock et al., 2016) for gaseous waste, as well as disclosure of waste and effluents (Da Rosa et al., 2015) to solid and liquid waste.

### *Firm Value*

Firm value is an economic measure that reflects the market value of a business. Firm value can be measured on the basis of the two points of view from the perspective of accounting and economic perspective (Buys et al., 2009 in Klerk and Villiers, 2012). From the perspective of accounting, the firm value is calculated based on the company's financial performance with using financial indicators, such as the ratio of earnings per share (earnings per share), the ratio of the rate of return against assets (return on asset), the ratio of rate of return against equity (return on equity), and other financial indicators. Some previous research measure the firm value based on the financial performance that is Nor et al. (2016), Rahman et al. (2009), dan Sarumpaet (2005).

Another perspective that is based on the economic performance of the company. the firm value is calculated by evaluating the market value of the company's equity or stock price (Buys et al., 2009 in Klerk and Villiers, 2012). Previous studies linked to the influence of corporate environmental information disclosure of companies more focused on the study of the relationship of environmental issues specifically related to special events or corporate environment and price shares of the company's stock price movement or (Plumlee et al., 2015). The economic performance of firms deemed more appropriate to use as a measure of the firm value. Some previous research that uses the proxy value in measuring the economic performance of the company, such as Wang (2015), Klerk and Villiers (2012), and Al-Tuwaijri et al. (2004)

## Hypothesis Development

### The Effect of Gas Emission Disclosure on Firm Value

The environmental issue is a sensitive issue that is currently become the public concern. The international community is concerned about environmental pollution that occurs in almost all countries around the world. The Industrial Sector is the largest contributor to waste emissions that potentially pollute the environment and is very risky to harm the preservation of the environment (Bai dan Sutanto, 2002). Along with the increasing of world population and the growing of world economic conditions, the industrial sector also grew rapidly. It also contributes to increased the waste emissions generated by the company (Taweesan et al., 2016).

The increasing of public concern to global warming has initiated for some countries to make a joint commitment in the face of this crucial problem. In 2002, a high-level Conference for the development of sustainability resulted a consensus that the company has a social and environmental responsibility to preserve the environment and survival of biodiversity (Watson and MacKay, 2003). Furthermore, the environmental activities of the company received special attention from the public and become part of the corporate social responsibility. Therefore, most of the information revealed in the corporate social responsibility report is an issue related to environmental information (Gunawan et al., 2009).

In the application, then some program designed by the Government as a regulator to evaluate the environmental performance of companies, such as the Toxics Release Inventory (TRI) in the USA, the National Pollutant Inventory (NPI) in Australia, and The company's performance Rating Assessment program (Program Penilaian Peringkat Kinerja Perusahaan-PROPER) in Indonesia. It is intended as a form of control from the Government to the company in performing the waste management program and ensuring that their operation is eco-friendly. On the other hand, the company also has a duty to perform the disclosure of related environment information to minimize the occurrence of asymmetry information both to the public and other stakeholders as well as to the shareholders as the owner of the company.

Responding to this matters, some companies started to make adjustments in the implementation of the practice of good corporate governance in particular aspects of transparency through the disclosure of related information of industrial pollution produced by the company. It is conducted as an effort to gain public legitimacy. In addition, the disclosure of environmental information is also potentially to minimize the risk of the companies, which is related to risk capital (Anggraeni, 2015). In Indonesia, regulation No. 15/28/DPNP/2013 states that banking who act as the lender is obligated to ensure that the company as a potential debtor has conducted environmental analysis as one component in the assessment of business prospects (Bank of Indonesia, 2013).

Unfortunately, most companies are still not optimally in conducting the activities of the disclosure. One reason is that the activity of the disclosure will cause additional cost. Jaffe and Palmer (1997) found a positive associative relationship between costs and regulations related to pollution by the company. In addition, the company still has doubt that the disclosure activity will affect positively on the company (Gunawan et al., 2009).

Some research suggests a positive relationship between the disclosure of environmental information by the company and firm value (Nor et al., 2016; Wang, 2015; Plumlee et al., 2015). This shows that the market gives a positive reaction to the company that discloses the environmental information. A better company which is disclosed more environmental



information will attract the attention of investors and financial analysts (Dhaliwal et al., 2011; Griffin and Sun, 2013). On the other hand, the environmental information disclosure as a principle of transparency by the company is an effort to minimize the agency problems that will risk the company's sustainability. Through the environmental information that disclosed by the company on its Annual Report, the stakeholders will understand more about the company's policies and motives in dealing with waste emissions produced by the company that will risk the environmental sustainability (Ahmad and Hossain, 2015) so it will increase the firm value.

Almost all the studies about the disclosure of waste information and the firm value were merely analyzing the gas emissions or GHG (Anggraeni, 2015; Matsumura et al., 2014; Griffin and Sun, 2013; Ziegler et al., 2011; Stanny and Ely, 2008). Most of them found a positive association between the disclosure of gas emission information and the firm value (Anggraeni goddess, 2015; Matsumura et al., 2014; Griffin and Sun, 2013; Ziegler et al., 2011). **H1:** The disclosure of gas emission information has a positive effect on firm value.

#### *The Effect of Solid Waste Disclosure on Firm Value*

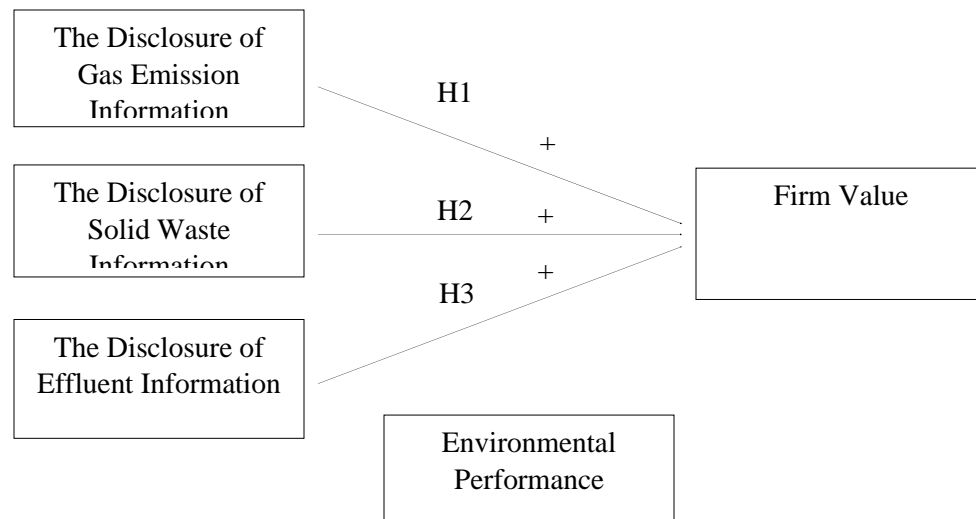
In addition to gas emission, the other type of industrial waste also have the potential risk to pollute the environment, such as solid waste. One of the most common methods of solid waste management is through the combustion process. Residue generated due to combustion of solid waste contains large amounts of dangerous pollutants, such as dust, dioxin, furans, mercury, arsenic, etc. (Hong et al., 2017).

Not only the gas emission, solid waste that generated by the company's operation activity also need to be disclosed as an efforts to get legitimacy from the public. However, in General, solid waste information disclosure is voluntary and less public attention. Therefore, the research examines the disclosure of solid waste information by the companies are extremely limited. Nevertheless, it is worth to observed because almost every industrial company produces solid waste from the production activity. Expected that the disclosure of solid waste information by the companies has a positive associative relationship on firm value as well as gas emission. **H2:** The disclosure of solid waste information has a positive effect on firm value.

#### *The Effect of Effluent Disclosure on Firm Value*

Similar with solid waste, research related to the disclosure of effluent information by the company is also very limited. In fact, effluent resulting from industrial activities potentially have the destructive effect of harming the environment. The company's effluent can contain a variety of heavy metals from industrial activity results, such as Sodium, Calcium, Magnesium, Sulfate, and other (Kadirvelu et al., 2001). Waste is easily seeping into the soil and contaminate the water flow, thereby threatening the survival of biodiversity in the area that is contaminated.

The Effluent information, as well as waste information by the companies, are generally included in an integral part of the corporate environmental reporting. Due to its voluntary, companies are still reluctant to do the disclosure information related activities industrial effluent. In fact, research conducted by the Dhaliwal et al. (2011), Klerk and Villiers (2012) dan Wang (2015) found that environmental information disclosure has significant effect to the value of the shares of the company. The same pattern is also expected to be applied to the disclosure of effluent information by the company. **H3:** The disclosure of effluent information has a positive effect on firm value.



**Figure 1.** Theoretical Framework

## Research Methods

### Population and Sample Research

The population in this research is the whole company PROPER participants registered in BEI 2016-2018 during the period. The population was chosen because the company is the company proper participant has the potential to cause environmental pollution. To get a sample in accordance with the objectives of this research, then the selection of the samples was done using a purposive sampling method. Purposive sampling is the selection of the sample in a population that has the information that best suits your criteria (Taylor et al., 2006). These criteria are as follows:

1. Firms which is listed as participants in PROPER organized by the Ministry of Environment of the Republic of Indonesia during the period 2016-2018.
2. The Firms that listed on the Indonesia stock exchange during the year 2016-2018.
3. The Firms that published the annual report and can be downloaded through the website of each company or Indonesia stock exchange's website.
4. The Firms that disclosed the information of gas emission, solid waste, and effluent (either one or together).
5. The Firms that had positive financial performance.

From the sample selection, there are 58 companies that meet the criteria. The observation period is determined for three years for the selected sample. Therefore, the total number of observations made as many as 174 observation. The Ohlson valuation model modified by Wang (2015) as the basic regression model in this study can be used only for a company that has a positive performance (Klerk and Villiers, 2012). Therefore, 31 observations in this research which have negative value is eliminated from the sample, bringing the total sample being 143 observations.

A. Industry Distribution									
	B	C	Ms	F	M	T	I	P	Total
#	20	15	8	6	5	2	1	1	58
Obs	45	39	18	17	12	6	3	3	143
%	31,47	27,27	12,59	11,89	8,39	4,19	2,10	2,10	100
B. Yearly Distribution									
	2014	2015	2016	Total					
#	48	42	53	143					
Obs	48	42	53	143					
%	33.57	29.37	37.06	100					
Note:									
Section A shows the distribution of sample firms across industries, where B = Basic Industry and Chemical; C = Consumer Goods; Ms = Miscellaneous (Automotive, Cable, and Textile); F = Farming; M = Mining; T = Wholesale and Retail Trade; Mf = Manufacturing; P = Property; # represents number; and % represents percentage. Section B shows the distribution by year; # represents number and % represents percentage.									

**Table 1.** The distribution of the sample.

Table 1 shows the number of the distribution of the sample used in this study based on industry sectors defined by the Indonesia stock exchange. Based on the chart, it can be seen that the sample of this research is dominated by companies engaged in the basic industrial sector and chemical as much as 20 companies in 45 observations (31.47%), then the industrial sector of consumer goods by as much as 15 companies in 39 observations (27.27%). Moving companies in the industrial sector and all manner of each of the plantation sector as much as the company's 8th in the 18 observations (12.59%) and 6 companies in 17 observations (11.89%), mining company 5 company in 12 observations (8.39%) , the company trades as much as 2 companies in 6 observations (4.19%), as well as infrastructure and property sector company each as much as 1 observation in 3 companies (2.10%).

## Definition and Measurement of the Variables

### Firm Value

The dependent variable in this research is the firm value. As the research that has been done by Wang (2015) and the Klerk and Villiers (2012), firm value is proxied by market value of the equity of the firm or also called the stock price. The market value of equity of a firm (FV) is a function of the firm's book value, in this study with the abbreviated "BV", abnormal earnings or "AE" and other non-financial information or "V" (Ohlson, 1995). However, the calculation of Abnormal Earnings valuation models in the Ohlson (1995) hard to quantify (Klerk and Villiers, 2012). Wang (2015) then modify the model valuation Ohlson (1995) by using the variable earnings per share replace variable abnormal earnings. According to Barth et al. (2001), the market value of equity that is reflected in the share price reflected the consensus of investor confidence towards the company. firm value (FV) is calculated based on the closing share price at the end of the fiscal year. The basic valuation model used in this study are as follows:

$$FV_t = BV_t + EPS_t + V_t$$

### The Disclosure of Waste Information

In General, the independent variable used in this study is the disclosure of information of industrial waste that resulted from firm operation's activity. In evaluating the company's waste information, this study uses three main waste as an independent variable, that is the gas emission (G), solid waste (W), and effluent (E) (Jiang and Mckibbin, 2002; Huang and Chen, 2015). This research uses content analysis techniques in measuring the variable the disclosure of information of industrial waste.

Content analysis techniques have been used in general to measure the level of disclosure of information and have been widely adopted by various studies related to the disclosure of environmental information (Trireksani dan Djajadikerta, 2016). Content analysis is one method of research that seeks to provide a definition in a systematic and objective in describing certain phenomena and quantify based on data in the form of oral (verbal), appearance (visual), and (Downe-Wambolt, 2009; Elo and Kyngas, 2008).

The previous study using multiple assessment methods to measure corporate environmental information disclosure. Deegan and Rankin (1996) in Krishnamurti and Velayutham (2017) using a number of pages, words, and sentences for converted quantitatively in the measurement of the value of environmental information disclosure of companies. This method is also used by Walden and Schwartz (1997); Trireksani and Djajadikerta (2016). Meanwhile, several other studies using the company's environmental report published to judged on content analysis techniques that quantified through a particular index, such as Wiseman (1982); Clarkson et al. (2008); Choi et al. (2013); Nor et al. (2016).

This study uses a measurement model is adopted from Trireksani and Djajadikerta (2016). This valuation model has also been used in previous studies of Djajadikerta and Trireksani (2012), Walden and Schwartz (1997), dan Ingram and Frazier (1980). Assessment of each free variable (disclosure of information solid waste, liquid waste, information disclosure or a disclosure of information waste gas) is done by way of reading and provide value quantitatively based on quality information the company waste (solid, liquid, or gas) for each are presented in the environmental reports of companies both in the company's annual report as well as a stand-

alone report. In the model of this assessment, the disclosure of information waste the company rated on the basis of three components, that is the description, time span, and specifications.

Dimension	Items	Score
Evidence	Monetary / quantitative	3
	non-monetary / qualitative	2
	Declarative	1
	No evidence	0
Time frame	Future	2
	Present	2
	Past	1
	No time frame	0
Spesificity	Detail	1
	General	0

**Table 2.** Component of the disclosure score.

In this study, the disclosure of waste information is measured by the specific aspects listed in Table 2. If there is no information related to information about waste (solid, liquid, or gas) on the report of the corporate environment, then it is given a value of 0. If there is a company that is waste information Declaration (either one of them as well as a whole), then given a value of 1. So next. The total value is the value of the disclosure of information waste any company that has a range of between 0 to 6. The index of the scope of the disclosure of each company's waste is calculated by dividing the average value with 6 which is the maximum value.

#### Earnings per Share

Earnings per share is the value of the firm's earnings per share at the end of the fiscal year (Wang, 2015). The earnings per share is measured using absolute values that presented in the firm's financial reports.

#### Book ValueBook

value is the firm's book value per share at the end of the fiscal year (Wang, 2015). The book value is measured by comparing the total equity of the company by the outstanding stock of the company.



### Environmental Performance

The firm's environmental performance is a control variable. Firms that have good environmental performance will gain public legitimacy. In addition, companies that have good environmental performance will tend to do more environmental disclosure on a voluntary basis, while poorly performing companies on the environment will tend to do voluntary disclosure is relatively limited (Clarkson et al., 2008; Al-Tuwaijri et al., 2004).

The variable of environmental performance (EP) is a measurable results of the achievement of an organization's environmental performance management related activities operations which include air, water, soil, natural resources, flora, fauna, humans, and all interactions (International Organization for Standardization, 2013). Some previous research evaluating environmental performance variables with a reliable proxy, i.e. using appraisal data pollution levels conducted by the institution of a special assessment, such as the Toxics Release Inventory (TRI) in the U.S. (Clarkson et al., 2008; Konar and Cohen, 2001), the Council on Economic Priorities (CEP) in America and the United Kingdom (Patten, 2002; Ingram and Frazier, 1980), and the National Pollutant Inventory (NPI) in Australia (Clarkson et al., 2011; Cowan and Deegan, 2011). In this study, the performance of the company is proxied with PROPER rating obtained by every company in Indonesia. This award consists of five color gold (very good), green (good), blue (reasonable), red (less), and black (bad). Environmental performance using variable intervals for each stage in succession, consecutive, where gold has the highest value that is 5 black and ranked the lowest value is 1. Several previous studies have also used the PROPER rank in measuring environmental performance, such as Anggraeni (2015), García et al. (2009), Wang et al. (2004).

### Analysis Method

This research uses secondary data. This data can be retrieved in the Corporate Responsibility Reporting of the companies that contained in the Annual Report or the stand-alone report that separate from the Annual Report. Data collected by selecting the sample and then download the company's report on the company's website or on the official website of the Indonesia stock exchange ([www.idx.go.id](http://www.idx.go.id)). The data of the PROPER participant companies obtained in the official PROPER website [www.proper.menlh.go.id](http://www.proper.menlh.go.id).

This research method using a multiple regression analysis with unbalanced panel data to test the variables examined. This analysis aims to see the relationship of the disclosure of information of gas emission, solid waste, or effluent on firm value of the PROPER participant companies listed in Indonesia stock exchange during the year 2016 to 2018. It is also used in the analysis of the environmental performance as a control variable.

To test the hypothesis in this study, the regression model used was adopted from Wang (2015) by modifying the variable information disclosure of waste gas, solid waste, liquid and waste companies. Regression models of research are as follows:

$$FV_{i,t} = \alpha_0 + \beta_1 G_{i,t} + \beta_2 W_{i,t} + \beta_3 E_{i,t} + \beta_4 EPS_{i,t} + \beta_5 BV_{i,t} + \beta_6 EP_{i,t} + \epsilon$$

Where,  $FV_{i,t}$  is firm value of firm  $i$  in the period of  $t$ ,  $G_{i,t}$  is gas emission disclosure by firm  $i$  in the period of  $t$ ,  $W_{i,t}$  is solid waste disclosure by firm  $i$  in the period of  $t$ ,  $E_{i,t}$  is effluent disclosure by firm  $i$  in the period of  $t$ ,  $EPS_{i,t}$  is earnings per share of firm  $i$  in the period of  $t$ ,  $BV_{i,t}$  is book value of

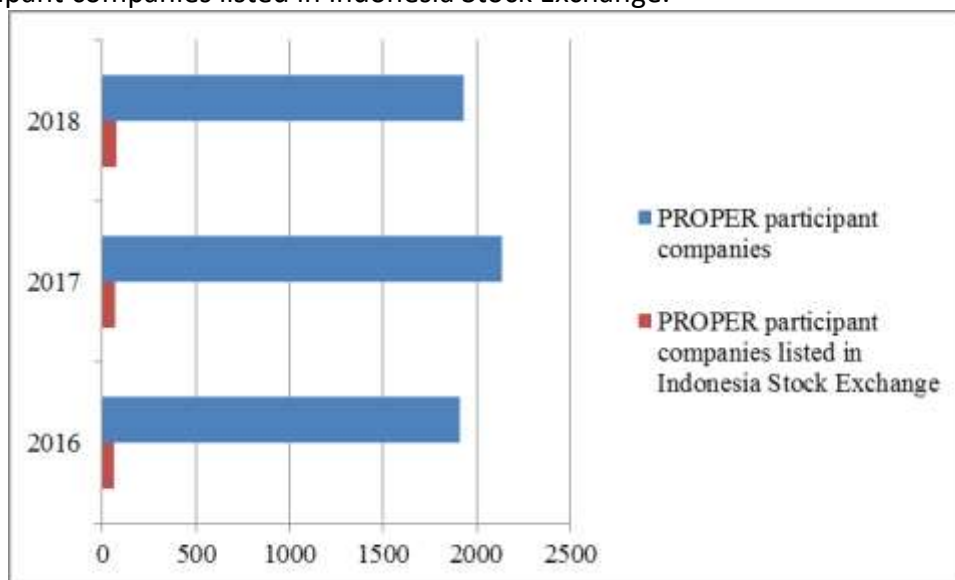
firm  $i$  in the period of  $t$ ,  $EP_{i,t}$  is environmental performance of firm  $i$  in the period of  $t$ , and  $\varepsilon$  is error term.

## Result and Discussion

### Sampling Characteristic

This research aims to test the relationship of the gas emission information disclosure, the solid waste information disclosure, and the effluent information disclosure on the firm value of the PROPER participant companies listed in the Indonesia stock exchange during the year 2016-2018. The sample in this study was selected using a purposive sampling method based on several criteria.

The data used in this research is the unbalanced panel data, where each unit has a number of cross sectional-observation is different for each period. The population in this research is the PROPER participant company listed in Indonesia stock exchange during the year 2016-2018. Based on Figure 2, the majority of PROPER participant companies still has not been listed in the Indonesia stock exchange. During the years 2016-2018 from 1,908 companies, only 77 companies participated in PROPER that listed in BEI. Figure 2 presents the data on the frequency of PROPER participant companies listed in Indonesia Stock Exchange.



**Figure 2.** The Frequency of PROPER Participant Companies

Figure 2 shows that the participatory level of companies listed at the Indonesia Stock Exchange that participated in PROPER is still very low. But there is increasing from year to year. In the year 2016, only 63 companies went public who participated in the PROPER participant. While in the year 2017 as much as 68 companies, and in the year 2018 as much as 77 companies.

Based on the criteria used in the sampling, 58 listed companies retrieved as samples in this research that became participants per year, so the PROPER amount of sample research into 174 observation data for three years. However, the valuation model used in the study cannot be used in companies that have a negative performance (Klerk and Villiers, 2012) so negative-valued observations 31 it is eliminated as a sample.

Data analysis was done using a regression test in advance of the testing done to prove that data has been freed from a classic assumption test. Hypothesis testing is carried out in accordance with the design hypothesis testing has been made, as well as data processed by using program Stata/SE version 14.2.

#### Descriptive Statistics

Descriptive statistics present the overview of the characteristics of the observed variable.

Descriptive statistics of the variables can be seen in Table 3.

	FV	G	W	E	EPS	BV	EP
<i>Unbalanced Panel Data period 2016 - 2018</i>							
Minimum	86	0	0	0	1.44	81.20	2
Maksimum	63900	6	6	6	3470	20562.59	5
Mean	6031.65	2.69	2.68	2.81	343.06	3160.66	3.15
Std. Dev.	10669.82	1.41	1.46	1.35	562.70	4477.46	0.57
Observations	143	143	143	143	143	143	143

This table presents descriptive statistics of all variables tested. FV is firmvalue measured by stock price. G, W, and E is the disclosure of gas emission, solid waste, and effluent measured by *dummy* variable using content analysis method based on specific criteria ranging from 0 to 6. EPS is earnings per share measured by earnings per share value in firm's financial report. BV is book value measured by total equity divided by total outstanding stock. EP is environtmental performance measured by *dummy* variable using PROPER index ranging from 1 to 5.

**Table 3.** Descriptive Statistics

Table 3 describes the descriptive statistics of the firm value as the dependent variable and the independent variable which are the disclosure of gas emission information, the disclosure of solid waste information, and the disclosure of effluent information. While earnings per share and the company's book value as the primary variable of the regression model, and environmental performance as a control variable in this research.

The average value of the firm value as the dependent variable is 6031.65 with the lowest value is 86 and the highest value is 63900. It indicates that the PROPER participant companies listed in Indonesia Stock Exchange during the year 2016 to 2018 which disclosed their information of waste had an average share price was Rp. 6,031.65,-per share.

The disclosure of gas emission, solid waste, and effluent respectively have almost similar average value, that is 2.69, 2.68, and 2.81 with the minimum value is 0 and the maximum value is 6. It means that the level of disclosure of the waste information of the PROPER participant companies

listed in Indonesia Stock Exchange during the year 2016-2018 was still relatively low, that is between 44.67% – 46.83% of the criteria that are set (2.68 – 2.81 of 6 as the maximum value).

Earnings per share and book value as the primary variable of regression model have an average value for each is 343.06 (the minimum value is 1.44 and the maximum value is 3470) and 3160.66 (the minimum value is 81.20 and the maximum value is 20562.59). It shows that the average earnings per share value and book value of the PROPER participant companies listed in BEI during the year 2016-2018 was Rp 343.06,-and Rp. 3,160.66,-.

Variable environmental performance as a control variable in the study. The average value for environmental performance is 3.15 with a minimum value is 1 and the maximum value is 5. This indicates that the PROPER participant companies listed in Indonesia Stock Exchange during the year 2016-2018 were dominated by companies that have the moderate level of environmental performance, which was "Blue" rating based on PROPER assessment rating.

#### Classic Assumption Test

Good regression model must have the best linear unbiased estimation (BLUE) results of the analysis. To obtain the results, this research conducts some classic assumption test, i.e. test of normality, multicollinearity test, heteroscedasticity test, and the test of autocorrelation.

#### Test of Normality

Test of normality of the data is conducted using statistical test of Shapiro-Wilk W Test. Statistical tests Shapiro-Wilk W Test is effectively used for a small number of samples. The result indicates that there are some extreme data (outliers), so that the regression model has an abnormal distribution of residual data. To obtain the results of the estimation of a regression model that is consistent and unbiased, then the distribution of the residual data is needed to be normal. One of the effective ways to solve an outlier on the residual data is trimming method with Winsorization approach. The Winsorization method is an approach that attempts to ignore deliberately few percents of the top and bottom residual data measurements fairly (Miller, 1993). Commonly, the Winsorization method is conducted in the measurement of the residual data by 10 – 25%. This research is using Winsorization method by 5% to solve the residual data which is not normal. After trimming, the residual data is retested by using the Shapiro-Wilk W Test. It can be concluded that the distribution of the residual data is normal after trimmed by Winsorization method.

#### Multicollinearity Test

Multicollinearity test in this study uses Pearson coefficient of correlation among variables. A regression model which is free from multicollinearity has a coefficient of correlation that is not more than 0.9 and not less than -0.9. The result of multicollinearity test can be seen in Table 4.

	FV	G	W	E	EPS	BV	EP
FV	1.0000						
G	0.7339	1.0000					
W	0.7375	0.7786	1.0000				
E	0.7501	0.8293	0.7706	1.0000			
EPS	0.8920	0.6880	0.6722	0.7130	1.0000		
BV	0.7335	0.6843	0.6506	0.7464	0.8231	1.0000	
EP	0.2116	0.3466	0.2950	0.3648	0.1878	0.2326	1.0000

This table presents Pearson coefficient of correlation of all variable tested. FV is firmvalue measured by stock price. G, W, and E is the disclosure of gas emission, solid waste, and effluent measured by *dummy* variable using content analysis method based on specific criteria ranging from 0 to 6. EPS is earnings per share measured by earnings per share value in firm's financial report. BV is book value measured by total equity divided by total outstanding stock. EP is environmental performance measured by *dummy* variable using PROPER index ranging from 1 to 5.

**Table 4.** Multikolinearity Test

Table 4 shows the coefficient of correlation of all variable tested is no more than 0.9 or less than -0.9. Based on these results, it can be concluded that the regression model used in the study is free from multicollinearity among variables.

#### Heteroskedasticity Test

Heteroskedasticity test is an indication that the variants between the residual are not heterogeneous which resulted in the estimate obtained is no longer efficient. This research used the Wald Test for Heteroskedasticity test. The results of heteroskedasticity test show that there is a suspected heteroskedasticity of the regression model. Heteroskedasticity issues are known do not affect the estimation of the regression model, so the result remains unbiased and consistent, but not efficient (Hayes and Cai, 2007). To be efficient, then the regression model is needed to be free of the heteroskedasticity. This research uses White's Heteroskedasticity-Consistent Variance and Standard Error in addressing the symptoms of heteroskedasticity (White, 1980). White's Heteroskedasticity-Consistent Variance and Standard Error is conducted using Robustness Test for the standard error of the regression model. With Robustness Test, a coefficient of estimation become immune to heteroskedasticity (Hayes and Cai, 2007).

#### Test of Autocorrelation

Autocorrelation test provided to test whether the regression model has a correlation between the residual error in periods  $t$  with the residual error in the period  $t-1$



(earlier). This study uses Wooldridge Test to detect the autocorrelation. The result shows that the regression model has no autocorrelation problem in the data.

### **The Result of Linear Regression**

This research aims to test the hypothesis by using multiple regression analysis. Multiple regression model is conducted to connect one dependent variable with some independent variables in a regression model to find out whether there is a relationship between independent variables on the dependent variable. Analysis of multiple regression is used to calculate the coefficient of regression which will determine whether the hypothesis will be accepted or rejected. Regression analysis uses a level of significance of 0.05 or 5%. This research is using a multiple regression analysis with Fixed-Effects Model in examining the unbalanced panel data. To strengthen the regression model from the heteroskedasticity problem, White's Heteroskedasticity-Consistent Variance and Standard Error is conducted using the robustness test on the regression model. The purpose is to make the conclusions of the regression become efficient. Robustness test is performed on the standard error of the regression model. The results obtained are shown in table 5.

Variables	Expected Sign	Coefficient	Prob.
G	( + )	795.810***	0.007
W	( + )	591.835***	0.002
E	( + )	708.197***	0.004
EPS	( + )	4.566***	0.002
BV	( + )	0.463***	0.000
EP	( - )	-581.266	0.197
C		-883.780	0.576
Observations	143		
Determination R-Square	0.7807		
Prob(F-statistic)	0.0000		

This table presents the results of linier regression which is used to examine the effect of gas emission information disclosure, solid waste information disclosure, and effluent information disclosure on firm value. G, W, E is the disclosure of gas emission information, solid waste information, and effluent information measured by *dummy* variable using content analysis method based on specific criteria ranging from 0 to 6. EPS is earnings per share measured by earnings per share value in firm's financial report. BV is book value measured by total equity divided by total outstanding stock. EP is envirotnmental performance measured by *dummy* variable using PROPER index ranging from 1 to 5. The result is  $FV_{it} = - 883.78 + 795.81G_{it} + 591.83W_{it} + 708.20E_{it} + 4.57EPS_{it} + 0.46BV_{it} - 581.27EP_{it} + \varepsilon_{it}$ .

**Note:** \*\*\* denote significant level at 1%

**Table 5.** The Result of Regression

Table 5 represents the results of the linear regression of all variables tested. Gas emission information disclosure, solid waste information disclosure, effluent information disclosure, earnings per share, and book value positively significant affect the firm value of the PROPER participant companies listed in Indonesia stock exchange during the year 2016-2018 at level 1%. Meanwhile, environmental performance negatively but not significantly affect firm value of PROPER participant companies. The determination R square value 78,07% shows the variation of the firm value in the PROPER participant companies listed in Indonesia stock exchange during the year 2016-2018 is caused by all independent variables in this research, that is, gas emission information disclosure, solid waste information disclosure, effluent information disclosure, earnings per share, book value, and environmental disclosure, while the rest 21,93% is caused by other variables which are not examined in this study.

The results of this study are in line with Matsumura et al. (2014), Griffin and Sun (2013), Ziegler et al. (2011), Clarkson et al. (2011a), and Al-Tuwaijri et al. (2004). Previous research found that the disclosure of gas emission information has a positive effect on firm value. The results

show that the disclosure of gas emission information which is exposed by the company got a positive reaction from the market. The market believes that information of gas emission is one of the important factors of sustainability prospect of the company in the future, so the higher quality of information of gas emission that disclosed by the company, the firm value will be higher. Therefore, the results of this study support the first hypothesis.

The results of this study state that the disclosure of solid waste information by the company has a positive effect on the firm value on the PROPER participant company listed in Indonesia Stock Exchange during the year 2016-2018. The same pattern as found in the gas emission information also occurs at the solid waste information that disclosed by the company. Although less public attention, but the market respond positively to the companies that disclose the information of solid waste. Therefore, the higher quality of the solid waste information that disclosed by the company can increase the firm value on the PROPER participant company listed in Indonesia Stock Exchange during the year 2016-2018. The result of this study supports the second hypothesis.

The results of this study also state that the disclosure of effluent information by the company has a positive effect on the firm value on the PROPER participant company listed in Indonesia Stock Exchange during the year 2016-2018. Besides the gas emission and solid waste information, the market also gave a positive reaction to the company that disclosed the effluent information. The higher quality of the effluent information that disclosed by the company, the higher firm value gained by the PROPER participant company listed in Indonesia Stock Exchange during the year 2016-2018. The results of this study support the third hypothesis.

## **Conclusion**

The results of this study found that there is a positive associative relationship between the disclosure of waste information that exposed by the company, whether the gas emission, solid waste, or effluent and firm value. The markets gave a positive reaction to the companies that voluntarily disclose their waste information. It shows that investors are confident by management who has capabilities in managing environmental impacts due to his company's operating activities (Anggraeni, 2015), so the company is predicted to keep its sustainability in the future. In addition, investors showed a high interest towards companies that disclose information reports in detail (Klerk and Villiers, 2012) and apply the principles of good corporate governance (Wang, 2015).

The results also in line with the signaling theory, where the disclosure of waste information voluntarily provided to boost up the reputation (Healy and Palepu, 2001) and give a positive signal to investors in capital markets (Wang and Hussainey, 2013). In other words, the disclosure of waste information can be considered as "good news" for the company in the capital market. In addition, the results indicate that management seeks to provide relevant information to shareholders to minimize asymmetry information related to the impact of the company's operating activities towards environmental sustainability.

The results support several previous research that stated the disclosure of waste information voluntarily has a positive relationship to increase the company's share price. Unfortunately, the level of disclosure of waste information by companies in Indonesia is still relatively low, compared to other developing countries (Achmad et al., 2017). Similarly, the quality of voluntary disclosure by companies in Indonesia which is also still relatively low,

especially their waste information. In fact, the disclosure of waste information potentially provides benefits for the company. Supposedly, there should be other factors that cause low levels of waste information disclosure voluntarily. Surely this can be examined specifically in further research.

This study provides additional insights for the managers in understanding consequences and consideration of the benefit related cost analysis decision-making to the activity of the disclosure of waste information by the company. It can be said that the low level of disclosure of waste information by the company is associated with the companies that have a lower firm value, and so the other side. Besides the managers, the results of the study also become important for the Board in the formulation of business strategy which is integrated on the issue of the environmental sustainability and climate change which is currently thriving in almost all countries in the world, including Indonesia.

This paper contributes to the literature by extending empirical research on voluntary disclosure beyond the focus of *three industrial waste* disclosure. Therefore, this paper offers new evidence to conceptualize how the effective disclosure mechanisms mainly in the firm's industrial waste information respectively are correlated significantly with the share price level. The extent of contemporary accounting literature on voluntary disclosure focuses primarily on management projection that is short term oriented (Dhaliwal et al., 2011). On the contrary, environmental disclosure, which has a broad scope, is associated with a firm's long-term development strategies and operation sustainability. Our results provide evidence on the empirical rationales and the consequences of the trend in voluntary environmental disclosure.

The study also has limitations that can be considered for further research, thus obtained better results in the future. Some limitations of this study include: (1) The selection of the independent variables only examined the information from the company's internal components. Supposedly there are still other more external components could potentially affect the firm value of the company. (2) the study only focused on the PROPER participant company listed in Indonesia Stock Exchange during the year 2016-2018, not expanded in the other non-PROPER company which also disclose the waste information. (3) the independent variables examined and allegedly affect on the firm value of the company is proxy by the *dummy* variable.

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