

The Effect of Environmental Management Practice on Firm Performance: An Indonesian Study.

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This study aims to examine the relationship between environmental management practice to firm performance in Indonesia. This study uses manufacture firms listed on the Indonesian Stock Exchange for the period 2012 to 2016. A total of 171 firm-year observations were examined. The analysis technique used is the ordinary least squares regression by SPSS 20 program. In this study, environmental management practice is measured using the efficiency of energy usage and efficiency of water usage. The research result shows that environmental management practice has a moderately positive relationship to firm performance. This result is mainly driven by the efficiency of water usage, while the efficiency of energy usage has no relationship to firm performance. This study is vital for the firm in the context of environmental management practice decision-making. It suggests that environmental management practice is needed to achieve a firm's objectives and improve its performance.

Key words: *Environmental management practice, energy usage efficiency, water usage efficiency, firm performance.*

Introduction

Recently, technology development has provided various benefits for business practitioners. Nevertheless, the benefits obtained by the firm from technology development has also had consequences for its risk. One of the risks that need to tending is environmental issues (Lutsey & Sperling, 2005). Environmental damage may be caused by either natural factors or human factors. There are some cases where human factors diminish the environmental quality – one of them is global warming. NASA has been conducting research during the year 2015-2016 to examine the consequences of CO₂ emission rise. The results show a rise in temperature in some countries such as America, Africa, and Indonesia. This result is because of the El Niño phenomenon, which is warmwater in the Philippines and Indonesia, moving

eastwards to South America and affects globally. As the water rises in temperature, the rain intensity will have lowered, thus some regions will be experiencing a drought and impact to the environment, society, and a firm's operational practice (Malhotra, 2011).

Climate change can affect the economy as it can lower the worldwide Gross Domestic Product (GDP). *Time magazine* has explained that the worldwide GDP will have possibly decreased by 23% in 2100, due to the changing climate. Aware of the effects that global warming can have indirectly on a firm's financial condition, management are putting severe attention toward preventing global warming (Nasih, 2019). Based on this, a firm will minimise any environmental damage directly due to its operations. A wise firm will adopt the Triple Bottom Line (3P) concept into its operational practices (Elkington, 1997). 3P refers to the combination of a firm's objectives to tend priorities not solely economically (profit), but also environmentally (planet), and socially (people). The concept of 3P was first introduced to reshape a firm's orientation, which solely tended profit, toward environmental disclosure and simultaneously became the guidelines for a firm to ascertain their sustainability on multiple levels into the future (Kocmanova et al., 2016). The environmental disclosure and good corporate governance can attract a favourable response from stakeholders (Harymawan et al., 2019).

One of the methods for a firm to disclose is its environmental effect, through an Environmental Management Practice (EMP). An EMP aims to decrease the ecological expense by shifting to the materials and technologies which are 'eco-friendly' (Corbett & Klassen, 2006). These practices will improve the efficiency of the production process, so in general, the firm is capable of being efficient in water and energy usage, saving money while also minimising its environmental pollution (Linton et al., 2007). The right ecological expense and technologies can be used to minimise the energy, fuel, and water usage, so it diminishes the environmental damages and production cost savings (Linton et al., 2007). This practice is supported by the government regulations related to the environment, which is *Laws No. 23 Year 1997* and *ISO 14001*. These two regulations contain environmental management practices in general. Aside from those two regulations, the government also introduced *Laws No 40 Year 2007* that regulates a firm's liability to manage their responsibility for both the environment and society. Nasih et al. (2019) argue that corporate social responsibility disclosure is a firm's commitment where the business entity not only focuses on the firm's profitability but also the social and environmental management aspect. If the profitability aspect is useful for the firm's financial condition, then the social aspect is useful for recovering the social perception and image toward the firm. CSR disclosure presents as a willingness to resolve social demands while providing a number of benefits for the community (Ekawaty, 2019; Ramadhan et al., 2019).

Prior studies have examined energy usage and efficiency. Lutsey and Sperling (2005) documented that there is a positive relationship between fuel and electricity efficiency in relation to the firm's profitability. Ferreira et al. (2010) argue that fuel efficiency is utterly needed as the demand for motor vehicles is continuously rising, which results in increases in emission and traffic jams. Besides fuel and electricity usage, there is water usage efficiency. The water usage efficiency is getting known when management needs to manage its water usage to minimise the cost incurred at the scarcity of water supply. By implementing water usage efficiency, the production costs that were needed previously can be deducted, so it increases the firm's profitability (Waidyasekara & Silva, 2016; Malhotra, 2011).

This study specifically aims to examine the relationship between Environmental Management Practices (EMP) and firm performance. The motivation for this study is that it is compulsory for a firm to undertake corporate social responsibility (CSR) strategies, which are in line with *Government Laws No. 70 Year 2009 Article 2 Verse 1*. This law presents the energy conversion at the national level as a government responsibility, either its local, city, or province and along with business practitioners and society. Aside from that, the performance of manufacture firms has fluctuated from 2012 to 2016, and the decline of GPP as the growth of the manufacturing sector has slowed (McKinsey, 2012). One factor that causes the lower performance of manufacturing firms is insufficient firm competitiveness support, such as labor market efficiency (Septiriana, 2016).

This study uses manufacture firms listed in IDX for the 5-year period from 2012 to 2016. 171 firm-year observations were examined. We used the SPSS 20 program to analyse the data. This study showed that Environmental Management Practices (EMP) have a positive relationship with firm performance. This indicates that a better quality EMP implementation generates a better firm performance also. Moreover, EMP that measured the efficiency of energy usage were not found to have a relationship to firm performance.

In contrast, the efficiency of the water usage variable is proven empirically to have a positive relationship to firm performance. This study implication for management provides suggestions that bring awareness to the environmental management practices. This awareness is needed and will be beneficial for a firm's operations. Those benefits of implementing EMP are more efficient in dealing a firm's environmental expense and can be perceived as social disclosure to society in general.

The rest of this paper will be organised as follows; Section 2 contains the research hypothesis development; Section 3 discusses the variable, sample and research model; Section 4 describes the empirical analysis and the result of the hypothesis test, and Section 5 offers a concluding remark and suggestions for future studies.

Literature Review

Theoretical Framework

The focus of the firm is not solely on operating profit but maintaining a decent relationship with several parties such as capital providers, consumers, employees, and managers. Commonly, there is a difference between stakeholder's and management's interest. Stakeholder's primary concern is the activities of the firm, while management tends to achieve the result that stakeholders desire through disclosing information by the financial report and corporate social responsibility report (Suaryana, 2011; Brenner & Cochran, 1991). According to the Stakeholder Theory, the management and capital provider has its interest (Freeman, 1984). The capital providers want a return for shares owned, while management will provide the return and reports to capital providers (Gray, 2001).

Referring to the Stakeholder Theory, the efficiency of energy usage and efficiency of water usage are beneficial for stakeholders. If the firm implements the efficiency of energy usage and efficiency of water usage, then the cost incurred will be lowered, and as a result, the amount of a firm's cash will increase. Another point, the implementation of these two eco-friendly actions will lower the risk of the firm, which is favourable for stakeholders. Aware of this, stakeholders give full support for the total implementation of energy and efficiency of water usage, hoping that the consumers will continue relying on the firm's product and this will increase the firm's profitability. In the end, the higher firm value will impact the shareholder's prosperity (Brigham & Gapenski, 1996).

On another side, the Legitimacy Theory also has a role in the context of the firm's sustainability report. Based on the Legitimacy Theory, voluntary disclosure is a social contract that can raise positive responses from the community (Deegan, 2002). Therefore, the firm need to make itself appear legitimate by employing some acts related to environmental sustainability. Executing these acts will bring the society to perceive the firm as not harmful to the natural environment. O'Donovan (2002) argues that legitimacy is an idea where if a firm wants its operation to be seamless, the firm needs to behave as the local society's swant. If the firm successfully behaves according to the local society's belief, that firm will be perceived positively by society (Burritt et al., 2002). The legitimate existence of the firm in society can be shown through how considerable the firm's operational affects are upon its nearby society.

Environmental Management Practice (EMP) is regarded as one method to improve the firm's image. EMP is a technique, policy, and procedure of the firm implemented to monitor and control its operational impacts on the natural environment. Perceptions of the EMP can be enabled to supervise and evaluate the data measured by finance or management as well as on

the efficiency of materials and energy, reduce the production process' environmental impact, and improve the results of corporate management (Ikhsan, 2009). Berry and Rondinelli (1998) explain that several factors drive the firm to conduct EMP, which are the cost factor, stakeholder pressure, and that it is a competitiveness requirement. EMP itself can be measured by the efficiency of energy usage and efficiency of water usage.

Relationship between Efficiency of Energy usage to Firm Performance

Higher energy usage has unfavourable influence on the firm's financial condition. This is caused by the energy usage tariff which is categorised as one of the highest costs. High energy usage leads to the depletion of a firm's funds (Iwata & Okada, 2011). If a firm spends too much on energy costs, then the operating expense will be excessive, and in the end, the cash amount will be decreased. Commonly, the decreases in cash amount are perceived by stakeholders as an unfavourable condition (O'Donovan, 2002). As energy usage by the firm becomes more efficient, the funds that firm needs will be decreased. For the stakeholders, efficient fund utilisation will produce trust in the firm's capability to manage its capital. If the firm already implements the efficiency of energy usage and gains stakeholder's support, most likely it will have a positive impact on future firm performance (Freeman, 1984).

Prior studies examine the relationship between energy efficiency to firm performance. Alcántara et al. (2018) argue that the efficiency of energy usage is the best method to decrease the production cost and pollution emissions. Painuly (2009) explains that financing costs that are provided by the financial institution have a positive relationship to firm performance as the funds provided are used to improve the energy efficiency while the firm's funds can be used for other investments. Bolukbasi et al. (2009) document empirical evidence that a positive and significant relationship exists between green process innovation and firm performance.

The efficiency of energy usage (EEU) is an act that utilises energy as minimally as possible and, at the same time, maintains the rationality of energy needed by the firm. By doing EEU and disclosing it, society will become aware of the firm's effort in terms of minimizing the operational impact on the environment (Rakino et al., 2019). Besides that, the firm also participates in preventing energy scarcity, which will increase the product price as a result of the firm's energy cost increasing. The minimization that the firm implements will be perceived positively by society, thus resulting in higher firm performance. As explained before, the hypothesis that we propose is:

H1: Efficiency of energy usage (EEU) has positive relationship to firm performance

Relationship between Efficiency of Water usage to Firm Performance

Water scarcity is a wide known problem and becomes a primary concern for government and regulators around the world (Kodoatie et al., 2000). Water is an essential resource for any industry to operates. Water is an essential element compared to other materials. Thus, it is logical to reuse water in an industrial process (Cech, 2005). As the water needs increase, a firm needs more coherent strategies to implement daily efficiency of water usage either in society or at the firm's production process level. The water needs phenomenon is worsened by insufficient water supply as a result of the greenhouse gas effect and extreme climate change. Several methods can be used for efficient water usage, including to manage water waste into clean water, or even drinking water (Sigalingging, 2019; Lubis et al., 2017). These are technologies to minimize energy and water usage in a particular industry are emerging (Majozi et al., 2006).

If a firm efficiently manages water usage by turning the wastewater into clean water through utilising eco-friendly technologies, it will cut the expense and thus improve firm profitability. The efficiency of water usage will impact positively on the firm's finances as the cost incurred to purchase water supply for the production process will be diminished (Turner & Müller, 2004). It is favourable news for stakeholders as the lesser cost is incurred, and the remaining funds can be used to maximize the production quality. Consequently, the product quality rises in consumer perception.

Prior studies examined the relationship between water efficiency to firm performance. Abe (2006) discusses the relationship between investment amount, water efficiency, and water tariff to Indonesian regional water utility firm's performance. The result shows that water efficiency has a positive relationship with the performance of Indonesian regional water utility. Another study conducted by Azizah et al. (2012) examines the relationship between Environmental Management Accounting (EMA) implementation as one of the eco-efficiency forms to a firm's competitive advantage. Eco-efficiency itself is a strategy that supports the decrease of costs and environmental impacts through using water and other material more efficiently. The result of this study shown that EMA, as eco-efficiency, has a positive relationship with the firm's competitive advantage, which directly improves firm performance.

The efficiency of water usage can elicit positive responses from society. By implementing efficiency of water usage, the water pollution that caused the firm's operations will be minimized (Abe et al., 2006; Cech, 2005). A better social perception of the firm will influence firm value. The firm that has a positive image from society will find it will be easier to gain society's attention. A positive response from society will impact social perceptions of

the firm's product awareness. As product awareness has increased, a firm's performance will improve. Based on these explanations, we hypothesised that:

H2: Efficiency of water usage has a positive relationship to firm performance

Research Methodology

Sample and Data Source

The sample used in this study is manufacture listed firms on the Indonesian Stock Exchange (IDX) for the period 2012 to 2016. These firms were selected if they published the annual report or sustainability report and also if that provided the data needed for this study's analysis. The research data is obtained from the annual report and sustainability report from the IDX website. The initial sample of this study is 693 firm-year observations. After we conducted several sample selection criteria, the final observation amount was 171 firm-year observations. The sample selection technique of this study used the census method by these several classifications as follows:

Table 1: Research Sample Criteria

Sample Criteria	Observation Amount				
	2012	2013	2014	2015	2016
Manufacture listed firms in IDX for period 2012 to 2016	130	135	141	143	144
Manufacture firms that delisted	(1)	(2)	(0)	(2)	(0)
Missing data	(100)	(103)	(107)	(105)	(108)
Total Observation	29	30	34	36	36

Variable Operationalization

The independent variable for this study is Environmental Management Practice (EMP) measured by two proxies, which are the efficiency of energy usage (EEU) and the efficiency of water usage (EWU).

Efficiency of Energy Usage (EEU)

The efficiency of energy usage is an energy utilisation activity effectively and, at the same time, maintains the rationality of energy needed by the firm (Bolukbasi, 2009). The efficiency of energy usage is part of an environmental management practice to assist a firm implement the efficiency of energy usage. It is hoped to decrease environmental damage that may have

occurred as a result of irresponsible energy utilisation, and benefits a firm's cost efficiency. This following formula measures the efficiency of energy usage:

$$EEU = \frac{\text{Energy cost of current period} - \text{Energy cost of previous period}}{\text{Asset turnover}}$$

Efficiency of Water Usage (EWU)

The efficiency of water usage is the optimisation of water usage that consists of water conservation and quality management (Biswas, 2008). The solution to the cost incurred controlling the production process is the efficiency of energy usage and efficiency of water usage. These acts become a consideration for stakeholders by implementing it. The negative impact on the environment will be minimized. Following Wagner (2007), the efficiency of water usage in this study is measured by this following formula:

$$EWU = \frac{\text{Water usage cost for current period} - \text{Water usage cost for previous period}}{\text{Asset turnover}}$$

Firm Performance (ROE)

The dependent variable used in this study is the firm performance measured by Return on Equity (ROE). ROE is a representation of profitability that is shared with shareholders, and it is a useful tool for the investor to measure the managerial performance of the firm. ROE is equal with total earnings after tax deflated by the firm's total equity.

Control Variable

Similar to other studies, there is the possibility of an endogeneity problem in the form of the omitted variable or excluding the required variable to explain the dependent variable in this study. This problem causing the parameter estimation within the model becomes bias. To deal with the endogeneity problem, this study employs a control variable, which is firm size. The firm size (SIZE) is measured by the natural logarithm of the firm's total asset. The higher of the total asset means higher chances for the firms to keep their existence in the long term. This description indicates that a firm that possesses a large amount of asset will find it easier to generate profit compared to a firm that only possesses a small amount of asset.

Methodology

This study employs ordinary least square regression analysis to examine the relationship between efficiency of energy usage (EES) and efficiency of water usage (EWU) to firm

performance (ROE) with SPSS 22 as supporting statistic software. The regression equation used in this study is:

$$ROE = \beta_0 + \beta_1 EEU + \beta_2 EWU + \beta_3 SIZE + e \quad (1)$$

Result and Discussion

Descriptive Statistic

Table 2: Descriptive Statistic Analysis

	Minimum	Maximum	Mean	Std. Deviation
ROE	-0.15986	0.31054	0.0916256	0.09328595
EEU	-0.98367	0.76504	0.0137787	0.18936468
EWU	-0.41142	0.37394	-0.0012128	0.05044472
SIZE	21.51825	31.42035	27.9179095	1.62392052

Table 2 provides the result of descriptive statistics analysis. According to this result, it is shown that the ROE average value is 0.0916256, and the standard deviation value is 0.09328595. As for EEU, the average value is 0.0137787, and its standard deviation is 0.18936468. The second independent variable, which is EWU, has an average value -0.0012128, and its standard deviation is 0.05044472. SIZE as a control variable has an average value of 27.9179095 and a standard deviation value of 1.62392052.

Classic Assumption Test

To ensure a research model is free from bias, the classic assumption test is needed. In this study, we employ four types of classic assumption test, which are the normality test, multicollinearity test, autocorrelation test, and heteroscedasticity test.

Normality Test

We employ the Kolmogorov-Smirnov test to test the normality of research data. A normally distributed data will have an asymptotic significance value of more than 0.05 (Ghozali, 2006). Specifically, if the Z value of the Kolmogorov-Smirnov test is not statistically significant, which is lower than 0.05, then the data is not normally distributed. At the same time, if more than 0,05, it will be classified as normally distributed data. Table 3 provides the result of the Kolmogorov-Smirnov test and shows that model 1 has a symp. sig. value of more than 0.05. It can be concluded that the data used by this study is normally distributed.

Table 3: Normality Test Result

Description	N	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)	Conclusion
Model 1	171	0.650	0.793	Normal

Multicollinearity Test

To test the existence of a multicollinearity issue within a regression model, we are using a tolerance and variance influence factor (VIF) test. If the tolerance value of more than 0.1 or VIF value is less than 10, then we can conclude that the regression model does not have any multicollinearity problem. Based on Table 4, the tolerance value on the three predictor variables is more than 0.1, and the VIF value is less than 10. Thus, it confirmed that this study's regression model is free from multicollinearity symptoms.

Table 4: Tolerance and VIF Test Result

Variable	Model 1		Conclusion
	Tolerance	VIF	
EEU	0.971	1.030	There is no multicollinearity symptom
EWU	0.959	1.042	
SIZE	0.987	1.013	

Autocorrelation Test

The Autocorrelation test is used to test the regression model if, within the model, there is a correlation between variable error in the current period with variable error in a previous error. To test the autocorrelation issue, we employ the Durbin-Watson test. Table 5 provides the result of the Durbin-Watson test. The result shows that $dl < (4-dw) > du$, which means that there is no autocorrelation issue. The dl value 1.714 and du value 1.786 is obtained from the Durbin Watson table with significance level at 5% and use 171 observations and three variables.

Table 5: Durbin-Watson Test Result

Durbin Watson (dw)	Lower Limit (dl)	(4 - dw)	Upper Limit (du)
1.276	1.714	2.724	1.786

Heteroscedasticity Test

The heteroscedasticity test is used to know whether or not the residual similarities between one observation and other observations. In this study, a heteroscedasticity test is used – the Glejser test – to examine whether or not there are heteroscedasticity symptoms. If the

significance level of each variable in the Glejser test is more than 0.05, then it can be concluded that the regression model does not have any heteroscedasticity problems. Based on the test result in Table 6, it is shown that the significance level (Sig.) of all variables included in this regression model is more than 0.05. Therefore, it can be concluded that the data used for this study do not have heteroscedasticity problems.

Table 6: Glejser Test Result

Model		Sig.
1	(Constant)	0.272
	EEU	0.753
	EWU	0.832
	SIZE	0.890

Main Analysis

Table 7: Ordinary Least Square Regression Analysis Result

Variable	Coef.	T	Sig.
(Constant)		-1.583	0.115
EEU	-0.086	-1.131	0.260
EWU	0.178	2.318	0.022*
SIZE	0.178	2.349	0.020

* The significance level at 5%

The regression analysis is employed to test the relationship between the efficiency of energy usage (EEU) and the efficiency of water usage (EWU) to firm performance. Table 7 provides the result of regression. Table 7 shows that the relationship between EEU to firm performance is not statistically significant as the significance level is 0.26, which is more than the required 0.05. The EEU regression coefficient value is -0.086, which means for every increase of EEU for one point, the ROE will be decreased by 0.086. The decrease in firm performance is caused by the rise in cost related to energy usage. The example is to finance the energy usage of the firm; the cash amount will be decreased. This result is in line with prior studies (Painuly, 2009; Alcantara et al., 2018) that document a negative relationship between efficiency of energy usage to firm performance, which means the rise of costs related to energy usage will diminish the firm performance.

Table 7 also provides a result that shows EWU has a positive and statistically significant relationship to firm performance, with a significance level of EWU is 0.022, which is lower than the required 0.05. Therefore, it can be concluded that if water usage has risen, the firm performance will also be increased. The efficiency of water usage implementation by the firm will not only affect the firm performance but also positively impact the environment. This

program shows the stakeholders that the firm, besides conducting its production activities to gaining profitability, is also aware of the environmental and social issues (Abe et al., 2006; Ferreira, 2010). This study result is in line with research by Al-Tuwaijiri et al. (2004), which found that the implementation of environmental management practices has a positive and statistically significant relationship to firm performance. Thus, it can be concluded that implementing EMP by conduct efficiency of water usage will improve the firm performance.

Aside from the previous result, based on the regression result on Table 7, it is also shown that firm size (SIZE) has a positive and statistically significant relationship to firm performance, with a significance level of 0.020, which is lower than the required 0.05. Thus, it can be concluded that if firm size is increased, the firm performance will also be improved.

Coefficient Determinant

Table 8: EMP Coefficient Determinant Test Result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1.	0,241 ^a	0,058	0,041	0,09133730

Table 8 provides the coefficient determinant test result from the regression model. The results show that the R square (R²) value is 0.058, which means that the contribution of EEU, EWU, and SIZE explain the ROE variable as 5.8% and the rest (94.2%) is explained by other variables that were not tested in this regression model.

Conclusion

This study aims to examine the relationship between environmental management practice (EMP) implementation to firm performance. This study uses manufacture-listed firms in IDX for the period 2012 to 2016. The research result shows that EMP, which measured by the efficiency of energy usage, has no relationship to firm performance. It means that the changes in the efficiency of energy usage do not significantly influence firm performance. On the other side, the efficiency of water usage has a positive relationship to firm performance.

The limitation of this study is the low trend of Indonesian firms to disclose their energy and water usage costs in annual reports or sustainability reports. For future studies, we suggest adding the research sample time frame and other industries such as mining or agriculture, so the amount of data relating to energy and water efficiency can be increased. This study's practical implication for management is to put greater concern on EMP. It is needed as EMP is beneficial for a firm's operational activities, providing more efficient results in terms of environmental expenses social disclosure for its various stakeholders.



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