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Does Eco-Efficiency Improve Financial Performance of Manufacturing Companies in Indonesia?

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ABSTRACT

This study aims to determine the impact of environmental performance proxied by eco-efficiency on the financial performance of manufacturing companies in Indonesia. İn this study, the multiple linear regression test was used to analyse the data. The sample of this study is manufacturing companies that listed at the Indonesia Stock Exchange from 2012 until 2016 with the total observation is 80 firm-years. The results of this study indicated that the average level of eco-efficiency osf the manufacturing companies is still relatively low (0.38). The environmental performance as measured by the eco-efficiency has a positive significant effect on the financial performance of the companies. Therefore, this study suggests that companies can improve their financial performance by enhancing their eco-efficiency level.

Apakah *Eco-Efficiency* dapat Meningkatkan Kinerja Keuangan Perusahaan Manufaktur di Indonesia?

ABSTRAK

Penelitian ini bertujuan untuk menguji pengaruh kinerja lingkungan yang diproksikan dengan *eco-efficiency* terhadap kinerja keuangan perusahaan manufaktur di Indonesia. Uji regresi linier berganda digunakan untuk menganalisis data penelitian. Sampel penelitian ini adalah perusahaan manufaktur yang terdaftar di Bursa Efek Indonesia periode 2012 sampai dengan 2016 dengan 80 jumlah observasi. Studi ini menemukan bahwa tingkat efisiensi lingkungan rata-rata perusahaan manufaktir masih rendah (0,383). Penelitian ini juga menemukan bahwa kinerja lingkungan memiliki pengaruh positif yang signifikan terhadap kinerja keuangan perusahaan. Dengan demikian, perusahaan dapat meningkatkan kinerja keuangannya dengan meningkatkan *eco-efficiency* perusahaannya.

1. Introductıon

Over the last two decades there has been an increase in public expectations of companies to become more environmentally responsible (Akrout & Ben Othman, 2016). Businesses are encouraged to be more competitive and innovative while at the same time being required to assume greater responsibility for the environment and society. To respond to these expectations, companies are start taking initiatives and strengthening their business procedures (Al-Najjar & Anfimiadou, 2012). Companies are beginning to add environmental performance to one of their concerns in addition to quality, service and cost (Brady, Henson, & Fava, 1999). From a general perspective, the meaning of environmental

performance is ensuring the use of actions that support sustainability of water, land, air, and ecosystem which are environmental attributes.

Reducing environmental impacts or restoring ecosystems creates substantial demands on corporate resources. This demand is a cost that needs to be accounted for which leads to the recognition of the concept of eco-efficiency. The concept of environmental efficiency is the midpoint between economics and the environment. Eco-efficiency is defined by Derwall, Guenster, Bauer, & Koedijk (2005) as economic value created by the company through the products and services it produces and the waste that is the impact of the production process.

Eco-efficiency is part of the management control process to reduce environmental damage and increase environmental productivity by reducing costs and creating value (Huppes & Ishikawa, 2005). Extensive support for eco-efficiency is found in many research literature Grady (1999), Huppes & Ishikawa (2009), Sun & Pratt (2014), Caiado, de Freitas Dias, Mattos, Quelhas, Leal Filho (2017), Yook, Song, Patten, & Il-Woon, (2017) and Fieldman (2014) highlighting that, when companies effectively signal that they are adopting eco-efficiency, they are perceived to have created shareholder value by reducing their risk profile.

However, there is still debate as to whether there is additional value to the company as a result of considering the environment on the business process. One party considers that all efforts to harmonize its activities with social or environmental conditions will have an impact on reducing shareholder value. The general assumption states that the costs incurred by companies to adhere to ethical standards make product prices higher. This potentially makes the company be disadvantaged in the market, resulting in a low level of profitability (Walley & Whitehead, 1994).

Other groups argue that social or environmental performance improvement strategies can enhance the efficiency of company output or even create new opportunities in the market (Sinkin, Wright, & Burnett, 2008). They emphasize that improving environmental performance will lead to the use of cost-efficient organizational resources so businesses that have high responsibility for the environment will be able to report higher profits better corporate values compared to less-responsible companies.

Research that examines the impact of environmental compliance on firm value has been considerable and the results are divergent (Ahmadi & Bouri, 2017; Hassel, Nilsson, & Nyquist, 2005; Plumlee, Brown, Hayes, & Marshall, 2015; Qiu, Shaukat, & Tharyan, 2016). However, until now, there have been no studies that have considered the implications of environmental efficiency concerning the context of environmental compliance and company performance yet. The role of environmental efficiency might help explain the inconsistency of the results of previous studies.

To get a more comprehensive understanding of the effect of environmental efficiency on company value, this study measures the eco-efficiency based on the actual concept, i.e. how much of a product is produced by a company using existing environmental resources. This approach is different from previous studies that measure eco-efficiency as corporate engagement or environmental policies adopted by companies or simply measure from the environmental disclosure index conducted by the company.

Based on the best knowledge of the researchers, the study on the impact of environmental performance towards company financial performance in Indonesia is still scanty. Research conducted by Sarumpaet (2005) examines the relationship between environmental performance and company performance, yet the measure used for environmental performance is still very common, namely the proper rating. As it is known that the proper rating is determined only based on whether the company has or has

not taken specific actions to tackle water, air and B3 waste pollution. Furthermore, this research attempts to use energy base as a measure of eco-efficiency. This study aims to identify the effect of eco-efficiency through the use of energy on corporate profitability in Indonesia. This paper will be organized as follows. In the next section literature review will be presented by discussing the theory, previous research and development of hypotheses. The section afterwards is methodology, discussion of results and lastly conclusions.

2. Literature Review

Research that examines the issue of environmental social responsibility generally uses the approach of signalling theory, legitimacy theory and stakeholder theory. Dye (1985) and Verrecchia (1990) state that firms voluntarily disclose information to reduce information asymmetries between managers and stakeholders to communicate the firm's good performance. Some research in this area that uses the signalling theory approach are (Li, Li, & Minor, 2016; Van de Velde, Vermeir, & Corten, 2005). The signalling theory suggests that "good" corporate citizens issue standalone CSR reports to eliminate information asymmetries that may prevent them from reaping benefits of their actions. Yet, signalling suggests that firms use standalone CSR reports as a signal of their superior commitment to CSR (Mahoney, Thorne, Cecil, & LaGore, 2013).

According to Gray, Kouhy, & Lavers (1995), the legitimacy theory, in its simplest form, holds that the existence of an organization depends on the way the community views whether the organization's value system is commensurate with the value system of society itself. It is said that the company must have a contract with the community. If the company can fulfil this contract, the company's actions will be legitimized.

Deegan (2002) states that disclosure on environmental social accounting can act as an initial response that can hamper legislative pressure to increase disclosure. As a result, social environment accounting disclosures in company reports can be used to anticipate or avoid social pressure. Besides that according to Deegan (2017) social environmental disclosure can also improve the company's image or status of its reputation.

Freeman (1998:46) defines stakeholders as "any group or individual who can influence or be influenced by the achievement of company goals". This group or individual can include employees, communities, communities, states, customers, even suppliers, competitors, local governments, stock markets, industrial bodies, foreign governments, future generations and non-human life. A dynamic and complex relationship between an organization and its surroundings is a focal point in stakeholder theory (Gray, 2000). Corporations are needed to achieve the ability to balance the conflicting demands of various corporate stakeholders (Roberts, 1992). Considering the increasing demand for transparency from business, disclosure practices have been accepted as an important medium for carrying out corporate responsibilities. This can be used to inform about the impact of business operations on society and the environment.

Furthermore, Freeman, Harrison, & Wicks (2007) focuses on the objectives of stakeholder theory on two main issues. First, the theory tries to realize the purpose of the company; this makes managers judge themselves by the value they generate and what is biased to retain the stakeholders together with the company. This will make the company's performance better. Second, it seeks to explore the management's responsibilities to stakeholders. This directs management to consider the type of relationship they want to create with their stakeholders. Managers must develop relationships, be able to motivate stakeholders and create a community where everyone gives the best to add value to the company (Freeman et al., 2007).

Donaldson & Preston (1995) and Freeman, Harrison, Wicks, Parmar, & de Colle (2010) have discussed the role of stakeholder theory for companies. According to them this theory can help to find whether or not there is a relationship between management goals and company goals such as growth and profitability. The implication if the company complies with the theory of stakeholders is that achieving company goals will be better than using other methods. Furthermore, stakeholder theory argues that there may be a conflict between the company's external costs (i.e. payments to holders) and internal costs (i.e. product quality costs, environmental costs) (Qiu et al., 2016). This theory states that financial performance, ultimately leads to higher explicit costs, which results in competitive losses. Therefore this study uses a stakeholder theory lens to observe the relationship that might exist between eco-efficiency and the company's financial performance.

Eco-Efficiency

"Eco-Efficiency" stands for "ecological-economic efficiency," a construct that shows increased productivity and simultaneously reduces costs with increased environmental performance (Bebbington & Larrinaga, 2014). The World Business Council for Sustainable Development first used the term in 1992 in publications and at the Earth Summit. Eco-efficiency refers to a process that seeks to maximize the effectiveness of business processes by minimizing the impact on the environment. the management philosophy adopted by eco-efficiency is an effort to improve the environment that results in parallel economic benefits (WBCSD, 2000). Eco-efficiency can be improved by creating activities that have economic value while reducing ecological impacts and the use of natural resources (Figge & Hahn, 2013).

According to the concept of eco-efficiency, the generation of pollution and waste is an indicator of inefficiency in the production process, creating non-value added costs that should be minimized or eliminated through processes and technological innovations that are more environmentally friendly.

By using the concept of environmental efficiency as part of corporate strategic planning, management can develop a direct link between corporate environmental goals and benefits (Ekins & Etheridge, 2006; Sinkin et al., 2008). Application of lean production techniques for input and output environments, resulting in management obtaining a competitive advantage (Liu, 2013). An indicator of good quality management is the adoption of an environmental management system (Ahmadi & Bouri, 2017; Cormier, Magnan, & Van, 2005; Fu & Wang, 2011; Guidara & Othman, 2012; Plumlee et al., 2015)

According to Caiado et al., (2017), eco-efficiency is a way to evaluate the parameters of sustainable development, reduce consumption of resources and their impact on nature, while maintaining or increasing the value of products produced by the company. Eco-Efficiency arises as a management response to the problems of production processes mainly related to waste Jollands, Lermit, & Patterson (2004) and is one of the analytical and measurable approaches for companies interested in practical ways to play a role in sustainable development (Willison & Co, 2009).

Eco-efficiency brings together two dimensions of economy and ecology by connecting products or services with influence on the environment. The Eco-efficiency of a product or service is calculated by the following formula (WBCSD, 2000), (Ichimura et al., 2009).

$$\text{Eco Efficiency} = \frac{\text{Products or services produced}}{\text{Environmental Influence}}$$

The influence of the environment in this case are Energy consumption; Materials Consumption; Water Consumption; Greenhouse gas (GHG) emissions; Ozone depleting substance (ODS) emissions (Şenol & Özçelik, 2012).

A review of the literature on environmental policies and corporate values identify a number of studies (Al-Najjar & Anfimiadou, 2012; Albertini, 2013; Connelly, Limpaphayom, & Nagarajan, 2012; Hassel et al., 2005; López-Pérez, Melero, & Javier Sese, 2017; Martínez-Ferrero, 2014; Qiu et al., 2016; Siagian, Siregar, & Rahadian, 2013; Sinkin et al., 2008; Wang, 2016; Yadav, Han, & Rho, 2016; Yu, Guo, & Luu, 2018). In general the results reveal a variety of findings. The variety of findings can be explained by various factors that may be sourced from the sample size, the definition of environmental policy concepts, the lack of a reasonable theory and the measurement of different environmental performance (Konar & Cohen, 2001).

Hassel et al., (2005) identify the correlation between market value and environmental performance of companies listing in Sweden. This study found a negative relationship that shows that companies that have good environmental performance are not appreciated by investors.

Researchers who concerned with costs support this argument. They found that good environmental performance is expensive, and has a negative influence on expected income and market value (Freedman & Jaggi, 2005).

A study that tested the hypothesis that the eco-efficiency concept applied as a business strategy has a positive relationship with the value of the company carried out by (Sinkin et al., 2008). This study found that companies that implement eco-efficiency as a business strategy will be able to make costs more efficient and increase profits, so they tend to get better results than companies that do not adopt the policy.

A total of 401 companies were sampled in this study. The existence of ISO 14001 certification and the publication of company environmental reports is an Eco-efficiency measure used in this study. The empirical test results prove the hypothesis.

The relationship between environmental policies has been examined by Al-Najjar & Anfimiadou (2012) using eco-efficiency data and company value in 201 companies in the UK using a five-year data period. The measures of environmental efficiency used are ISO 14001 certification and reports on corporate social responsibility (CSR), and companies recognized at BIE with a good FTSE4 index. The research findings support previous research which shows a positive relationship between market prices and eco-efficiency.

Research conducted by Qiu et al., (2016) hypothesizes that companies with high social environmental disclosure will have high market values. In his analysis Qiu et al., (2016) distinguish between social disclosure and environmental disclosure. Social and environmental disclosure is measured through disclosure in the annual report. This study found no relationship between environmental disclosure and profitability. But there is a relationship between social disclosure and the corporate market.

Furthermore, a study conducted in Indonesia by Siagian et al., (2013) aims to investigate the direct and indirect relationship of environmental disclosure to financial performance, environmental performance and firm value. This research proves that environmental disclosure does not affect the company's market value. This study uses GRI-G4 guidelines as disclosure indicators and PROPER as a measure of environmental performance. The measure of environmental performance used by Siagian et al., (2013) is the same as the one used by (Sarumpaet, 2005).

Yu et al., (2018) examined how the impact of environmental, social and governance (ESG) transparency and the level of ESG disclosure on firm value. Reducing information symmetry and investor agency costs is a better transparency mechanism of ESG has the potential to impact corporate value. The Bloomberg ESG disclosure

score was used to assess the transparency of corporate ESGs, with sample firms in 47 developing countries. Empirical analysis indicates that the benefits of ESG disclosure are greater than the average cost incurred by the firm. Yu et al., (2018) found supporting evidence for greater, disclosure of LST issues that increased the size of corporate valuations, such as Tobin's Q. In addition, it was found that companies with greater asset size, better liquidity, higher R & D, less insider ownership and good past financial performance will be more transparent in ESG matters.

The effect of environmental performance on company value has been investigated by Yadav et al., (2016). The researcher used the event study approach to the announcement of the Newsweek 2012 'Green Rating' for large US companies. This study specifically analyzes the impact of green scores and the green rating of companies on the performance of companies in the stock market.

The results of the study reveal that according to investor announcements are positive signals, which lead to significant cumulative abnormal return standards (SCAR). By using the control variable in the form of industry-specific and company-specific effects, it was found that companies that ranked recurring green had a much higher SCAR compared to companies with reduced or unchanged environmental performance. In addition, an environmental impact score measuring the environmental damage of a company's operations is found to be the most influential factor in increasing company value.

Various studies that claim to examine eco-efficiency, generally using a measurement that is too broad to be represented as the concept of eco-efficiency. They use ISO14001 or use disclosure on environmental issues in the annual report as a measure of eco-efficiency. Although this measure may be regarded as a form of corporate concern for environmental issues, it has not yet been able to show the actual measurements of the concept of eco-efficiency. This research contributes to the effect of eco-efficiency on corporate profitability in the concept of environmental costs contained in each product produced by the company as referred to in Ferreira et al., (2016). Based on theory and literature review above, this research will test whether there is an influence of environmental performance as measured by eco-efficiency to financial performance

3. Data and Methodology

Population and Sample

The population of this study is manufacturing companies listed on the Indonesia Stock Exchange for the period of 2012-2016. Manufacturing companies were chosen as objects in this study because manufacturing companies normally operate in environmentally sensitive sectors, and also generally use higher resources/energy. So that demands for energy efficiency are higher in this sector. Samples are chosen by purposive sampling based on the criteria for the companies that disclose information about the use or consumption of energy, especially electrical energy. According to WBCSD (2000) the environmental influences on products can be traced through energy consumption, material consumption, water consumption, emission reduction, and ozone release. Since there are still very few companies reporting energy consumption, this study only managed to obtain a total of 80 units of analyses. Electricity consumption (KWh) was chosen in this study because not many companies are disclosing energy consumption other than electricity.

Environmental Performance

Environmental performance used in this research is a performance in the form of eco-efficiency which is measured by the number of electricity usage in KWh. This data is disclosed by the company through an annual report or environmental report. To measure the efficiency the following formula is used:

$$\text{Eco-efficiency} = \frac{\text{Number of Units produced year n}}{\text{Use of electric energy (KWh) year n}}$$

Financial Performance

With regard to financial performance, the literature proposes two models to measure this concept. Stock performance, market returns, stock prices, are market-based measures such as those used by some researchers such as (Barnett & Salomon, 2012; Dowell, Hart, & Yeung, 2000; Kumar & Prakash, 2018; Luo & Bhattacharya, 2006; Schnietz & Epstein, 2005). This approach is taken into account when analyzing, for example, the financial impact of environmental events (such as environmental disasters) on stock prices.

Accounting-based approach in measuring financial performance such as profitability, asset returns, asset turnover and growth is the second approach that is also widely used by researchers (Carter, Kale, & Grimm, 2000; Goll & Rasheed, 2004; Peinado-Vara, 2014; Ruf, Muralidhar, Brown, Janney, & Paul, 2001; Wu & Shen, 2013). According to Van Beurden & Gössling (2008) both models have benefits for measuring financial performance. In this study, accounting-based approaches are used because they reflect the internal efficiency of an organization (Fuzi, Desa, Hibadullah, Zamri, & Habidin, 2012; Qiu et al., 2016; Rokhmawati, Sathye, & Sathye, 2015).

$$ROA = \frac{\text{Profit before interest and taxation}}{Average\ Total\ Assets}$$

Firm Size

Meanwhile, firm size is measured using natural logs of total assets used as control variables in this study, since many studies have proved that firm size is a determinant of firm performance (Humphery-Jenner & Powell, 2014; McGuire, Sundgren, & Schneeweis, 2018; Stanwick & Stanwick, 2013; Udayasankar, 2008; Vaona & Pianta, 2008).

The Data Analysis

To test the effect of eco-efficiency on company performance used multiple linear regression test with equation as follows:

$$ROA = \beta 0 + \beta 1ECO + \beta 2SIZE + \varepsilon$$

ROA = Financial Performance
ECO = Eco-efficiency
SIZE = Ln Total Asset
ε = error

4. Findings and Discussions

Table 1 shows the average value of each variable for each company. Based on the data in table 1, the highest eco-efficiency is found in the company 8, with a value of 1.241914. This means that for every KWh of electrical energy used, capable of generating an average of 1.24 units of products. While the most inefficient use of electric energy occurs in company 7, indicated by the average number of eco-efficiency of 0.002992. This shows that per KWh of electrical energy used by the company can only produce 0.002992 units of products. The data in Table 1 also show that the ROA mean at company 8 is higher (0.178) than the ROA mean at company 7 (0.0904).

Table 1: Eco-efficiency, ROA and SIZE per sample firm

No	Firm Code	Mean ECO	Mean ROA	Mean SIZE
1	Company 1	0.705036	0.183	30.93
2	Company 2	0.010400	0.1475	28.56
3	Company 3	0.033158	0.1478	31.18
4	Company 4	0.007608	0.0012	27.69
5	Company 5	0.005508	0.036	29.50
6	Company 6	0.109492	0.0484	33.06
7	Company 7*	0.002992	0.0904	29.04
8	Company 8***	1.241914	0.178	27.86
9	Company 9	0.443064	0.1042	25.36

10	Company 10	0.517142	0.206	28.27
11	Company 11	0.389164	0.0809	28.77
12	Company 12	1.008952	0.0992	26.27
13	Company 13	0.140795	0.0749	25.90
14	Company 14	0.991506	0.0205	28.96
15	Company 15	0.006898	0.042	26.63
16	Company 16	0.402135	0.1064	27.31
17	Company 17	0.285855	0.082	26.02

Table 2, present the statistical descriptive of the research variables. Eco-efficiency has a mean value of 0.3837. While the minimum value is 0.00015 and the maximum value is 1.84386. The ROA variable has a mean value of 0.089084 with a minimum value of -0.1369 and a maximum of 0.2606. Size which is control variable in this research has mean value 28.4087, minimum 25.25 and maximum 33.2.

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ECO	80	.00015	1.84386	.3837418	.46015426
ROA	80	-.1369	.2606	.089084	.0827617
SIZE	80	25.25	33.20	28.4087	2.02314
Valid N	80				

The mean value of Eco-efficiency in table 2 shows that for every KWh the electrical energy used by the company produces an average of 0.3 units of product. The maximum value indicates that per KWh of electrical energy used can produce as many as 1.8 units. Likewise, the minimum rate indicates the high usage of electrical energy, which per KWh can only produce 0.00015 units of products. Low eco-efficiency figures indicate that the company is not yet fully pro-environment in its operations, specifically in its energy-saving electrical policy. This indication is getting stronger when viewed from the distribution of frequency of eco-efficiency value in table 3.

The data in table 3 shows the number of sample companies that have an eco-efficiency value below the mean and above mean. Of the 80 sample companies, 62.5% (50 companies) had eco-efficiency less than 0.3837418. Only 37.5% of companies have eco-efficiency values above the mean. The low level of eco-efficiency illustrates that there are still many companies that are not too concerned about environmental issues. The low number of eco-efficiency shows that companies use too much energy to produce their output.

Table 3: Distribution of Eco-efficiency by Mean Values

Eco-efficiency	Frequency	Percentage
< 0.3837418	50	62.5%
> = 0.3837418	30	37.5%
Total	80	100%

The data in table 3 also shows that the company's attention to the issue of energy saving has not been too serious. Nevertheless, the company's transparency to disclose this data also deserves appreciation. It is unfortunate, because as confirmed by Bidwell & Resources (2000) that eco-efficiency is a concept that has been introduced to business people around the world,

who invite companies to get more value from more efficient use of materials and sources while reducing emissions.

Table 4: Hypothesis Test Result

Variable	t value	Coefficient
(Constant)	-1.149	0.254
ECO	3.015	0.003
SIZE	1.694	0.094
R Square		0.121
Prob > F		0.007

The result of multiple linear coefficient test shows t value of 3.015 with significance level 0.003 < 0.05 for ECO. This means that the hypothesis that states that the environmental performance affects on the financial performance is accepted. This finding is in line with the results of the studies of (Carvalho Ferreira, Sobreiro, Kimura, & Flavio, 2016; Hayatun, Burhan, & Rahmanti, 2012; Magness, 2006; Ramiah & Gregoriou, 2015). Although their research uses a variety of measures of environmental performance, it generally proves the same thing, that there is serious attention from the company to environmental issues that will affect the company's financial performance. While it is related to the variable size of the company, there is no evidence that the size of the company has a significant effect in this study. This finding is not in line with the previous research likely because the sample used in this study consisted of a variety of company sizes while the number of samples was quite small. Another thing that might cause size is not influential in this case because the intention to become a company that is pro-environment does not depend on the size of the company, but more on the awareness to be a part of sustainable development.

The R square number in table 4 shows the value of 0.121. This shows that eco-efficiency in this case can only influence financial performance of 0.121. There are still many other things that influence the company's financial performance. This is possible because environmental issues have not become a major issue in the company's operational activities in Indonesia. This is supported by data in table 3 which shows that the majority (62.5%) of the sample companies have low eco-efficiency rates.

F test results show a significance value of 0.007 (<0.05). This means that simultaneously both variable eco-efficiency and firm size have an influence on financial performance measured by ROA. This finding is in line with Moneva, Archel, & Correa (2006) in his research proving that improving environmental performance will maintain the efficiency of the company. Similarly, Adams & Frost (2008) and Gray (2006) state that companies that focus on ecological and environmental programs tend to have better financial performance. The use of eco-efficiency measures, in this case provides more tangible evidence that the company's pro-environment activities implemented in the form of more efficient energy use will have implications for the company's better financial performance. This finding is supported by the results of the study Xiong, Li, Gonzalez, & Song (2017) who found an increase in eco-efficiency in industries in China in the period 2006 – 2013 specifically for companies that have good financial performance.

5. Conclusion

Our paper builds on literature that investigates the link between environmental performance and financial performance. We extend this work in ways by using eco-efficiency as a measurement for environment performance. This research uses a sample of 80 firm years listed in the Indonesian

Stock Exchange. It was found that the average level of eco-efficiency of the company is still low, that is 0.383. This means that for every KWh the electrical energy used can only produce 0.383 products. In addition, it was found that the environmental performance as measured by eco-efficiency had a positive significant effect on the company's financial performance. This study provides additional evidence that giving more attention to the environment will not adversely affect the company's finances. The findings of this study also provide evidence that the responsibility of management to stakeholders based on the theory of stakeholders can be implemented simultaneously by using the concept of eco-efficiency.

The limitations of this study are is mainly due to the small number of samples. There are still very few companies in Indonesia that disclose environmental policy information in particular how much energy is used in the company's operations causes a limited sample. Subsequent research is expected to increase the number of samples as it is expected that in the following years more firms will disclose their environmental performance data.

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