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ECO-EFFICIENCY AND FINANCIAL PERFORMANCE: AN EVIDENCE FROM INDONESIAN LISTED COMPANY (USING THE EMISSIONS INTENSITY APPROACH)

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ABSTRACT

Purpose: *This study aims to examine the effect of eco-efficiency on the company's financial performance. This study uses natural resource-based theory to provide empirical evidence regarding the effect of sustainability policies in the form of emission reductions on the financial performance of companies listed on the Indonesia Stock Exchange.*

Methodology/approach: *The concept of eco-efficiency is measured using the emission intensity approach. This study uses a period of data panels from 2019 to 2021 to capture the effect of eco-efficiency on the company's financial performance. Using three accounting measures of financial performance in the research model: ROA, ROE, and ROS, to understand in more detail the impact of eco-efficiency on the company's financial performance.*

Findings: *This study finds that eco-efficiency positively impacts financial performance. This finding implies that the fewer Green House Gas emissions produced, the higher the company's financial performance.*

Practical implications: *These findings prove to the company that emission reduction policies can positively impact the company's financial performance.*

Originality/value: *This study uses a measure of eco-efficiency that is different from previous research by measuring eco-efficiency in the context impact on the environment from company operations through the emissions produced by the company.*

KEYWORDS: *Eco-Efficiency; Emission Intensity; Financial Performance; Natural Resource-Based Theory.*

ABSTRAK

Tujuan Penelitian: Penelitian ini bertujuan untuk menguji pengaruh eco-efficiency terhadap kinerja keuangan perusahaan. Penelitian ini menggunakan natural resource-based theory untuk memberikan bukti empiris mengenai pengaruh kebijakan keberlanjutan berupa pengurangan emisi terhadap kinerja keuangan perusahaan yang terdaftar di Bursa Efek Indonesia.

Metode/pendekatan: Konsep eko-efisiensi diukur dengan menggunakan pendekatan intensitas emisi. Penelitian ini menggunakan panel data periode 2019 hingga 2021 untuk menangkap pengaruh eco-efficiency terhadap kinerja keuangan perusahaan. Menggunakan tiga ukuran akuntansi kinerja keuangan dalam model penelitian: ROA, ROE, dan ROS, untuk memahami lebih detail dampak eko-efisiensi terhadap kinerja keuangan perusahaan.

Hasil: Penelitian ini menemukan bukti bahwa eko-efisiensi berdampak positif pada kinerja keuangan. Temuan ini menyiratkan bahwa semakin sedikit emisi Gas Rumah Kaca yang dihasilkan, semakin tinggi kinerja keuangan perusahaan.

Implikasi Praktik: Temuan ini berimplikasi sebagai dukungan bagi perusahaan bahwa kebijakan penurunan emisi dapat berdampak positif terhadap kinerja keuangan perusahaan.

Orisinalitas/kebaharuan: Penelitian ini menggunakan ukuran eco-efficiency yang berbeda dengan penelitian sebelumnya dengan mengukur eco-efficiency dalam konteks dampak terhadap lingkungan dari operasi perusahaan melalui emisi yang dihasilkan oleh perusahaan.

KATA KUNCI: Eko-Efisiensi; Intensitas Emisi; Kinerja Keuangan; Teori Berbasis Sumber Daya Alam.

INTRODUCTION

Recently, the business world has shown a growing interest in reducing pollution. Chicago Climate Change shows how companies, financial markets, and governments design strategies to mitigate climate change impacts together (Ding & Beh, 2022). Through continuous adaptation, the company seeks to meet the demands of public investors. This phenomenon shows a shift in the company's strategy on a commitment to environmental responsibility (Milanés-Montero et al., 2022). Fu et al. (2020) state that social goals are one of the goals investors achieve in addition to financial goals. Meanwhile, (Ho et al., 2021) found that responsible investment in emerging markets can bring investors portfolio returns.

The concept of eco-efficiency was first described by (Diebold & Schmidheiny, 1992) and widely published by (Schaltegger & Sturm, 1996) and the World Business Council for Sustainable Development (WBCSD). Since then, eco-efficiency has been accepted as a

leading strategy topic in global business concerning commitment and sustainable development.

According to (WBCSD, 2000), eco-efficiency is "the achievement of competitively priced delivery of goods and services that meet human needs and improve the quality of life, while gradually reducing ecological impacts and resource intensity throughout the life cycle to at least at the line with the estimated carrying capacity of the Earth."

According to (Heikkurinen et al., 2019), eco-efficiency can be measured by the production value approach in two ways. The first approach is to use a ratio of several measures of economic value added to several measures of environmental impact: the higher this ratio, the more efficient the environment is the environmental performance. On the other hand, an inverse relationship, known as eco-intensity — a measure of the environment divided by economic value, with a lower indicator meaning better eco-efficiency — is also an acceptable measure.

The notion of eco-efficiency and its relationship to financial performance is a relatively new topic in developing countries, both in business and academia (Sudha, 2020). In contrast, developed countries have focused on environmental public policies to maintain corporate value and improve market efficiency and business models (Al-Najjar & Anfimiadou, 2012; Bianchi et al., 2020; Pérez-Calderón et al., 2021; Scarpellini et al., 2020).

In addition to being new, the idea of sustainability raises debate about whether the initiation of sustainability will impact company profits or value. On the one hand, a group believes that any attempt to improve social or environmental performance will reduce the company's profits. The general thought is that the company's cost to comply with such ethical standards will lead to higher product prices which will put the company at a disadvantage in the industry, leading to lower profitability (Landrum & Ohsowski, 2018). Another group argues that social or environmental performance improvement strategies can increase the efficiency of a firm's output or even create a niche market (Taha et al., 2023). They assert that better environmental performance will lead to the cost-effective use of organisational resources so that environmentally responsible businesses can report higher profits leading to increased value than less responsible companies.

Several studies provide mixed evidence for the relationship between eco-efficiency and profitability or firm value (Caiado et al., 2017; Guenster et al., 2011; Suh et al., 2014; Sudha, 2020; Sinkin et al., 2008; Al-Najjar & Anfimiadou, 2012; Broadstock et al., 2019; Czerny & Letmathe, 2017; Astuti et al., 2022; Safitri et al., 2019; Saraswati et al., 2021).

In general, research on eco-efficiency associated with environmental performance and economic performance of companies uses several different terminology and measures, both in measuring eco-efficiency and in measuring the economic-financial performance of companies. So this may be the cause of the different and inconsistent results. Therefore, this study will try to contribute to the eco-efficiency literature by using eco-efficiency measures in the context of the impact or impact on the environment from company operations which can be measured by energy, water, materials used, or emissions and waste generated (WBCSD, 2000).

This study uses greenhouse gas (GHG) emissions as a measure of eco-efficiency because this measure not only measures sustainability activities but is an independent objective and actual result based on the resources used by the company. There are two reasons to justify GHG emissions as an eco-efficiency proxy. First, political and practical development focuses on realising the SDGs and the Paris Commitment, focusing on climate mitigation and

supporting policies on carbon risk portfolios. This policy concentrates on reducing energy consumption and GHG emissions. Second, GHG, measured by the equivalent of carbon dioxide emissions, is a well-accepted and well-used operationalisation in business research (Qian & Schaltegger, 2017).

Besides that, this study uses three accounting measures of financial performance in the research model: ROA, ROE, and ROS, to understand in more detail the impact of eco-efficiency on the company's financial performance. Furthermore, this study uses the specific characteristics of the company's leverage and company size as control variables. Firm size is a control variable because larger firms can exploit economies of scale and scope better than smaller firms (Heikkurinen et al., 2019). Leverage is part of the company's risk associated with debt. Many previous studies have proved leverage as a factor that affects profitability (Elsayed & Ammar, 2020; Gunarsih et al., 2020).

The originality of this study lies in providing empirical evidence of the economic effects of the eco-efficiency of companies listed on the Indonesia Stock Exchange. This research contributes to the ongoing debate on the relationship between eco-efficiency and financial performance through an environmental intensity approach, evaluating whether energy consumption and a low ratio of CO2 emissions to production can improve a company's financial performance. This research also explains how environmental sustainability, measured by eco-efficiency, affects a company's financial performance. In addition, this study uses three data panels from 2019 to 2021 to capture the effect of eco-efficiency on the company's financial performance.

Eco-efficiency as a concept of environmental efficiency began to emerge in the 1970s. As an environmental factor, this concept renewed interest in the manufacturing sector in the 1990s. Environmental efficiency is extended to eco-efficiency as a business link for sustainable development (Qian & Schaltegger, 2017). Eco-efficiency is a concept beginning to be applied in academia and practice to assess environmental management and corporate responsibility (Gürtürk & Hahn, 2016; Reimsbach et al., 2018). Efficiency generally refers to producing the maximum amount of output with the least amount of input. However, eco-efficiency in environmental management has a slightly different meaning; for example, carbon emissions are an undesirable output (Burritt et al., 2011). In this regard, the eco-efficiency theory proposed by (Porter & Linde, 1995) states that firms can maximise their efficiency by reducing costs and creating value while minimising their environmental impact. Huppes and Ishikawa (2009) mention that eco-efficiency is a multidimensional concept related to context-specific analysis.

In addition, Huppes & Ishikawa (2009) show that eco-efficiency metrics have been used differently. There are four variable inversion sequences, and two approaches are used: first, the value of the production approach, which focuses on environmental intensity (environmental measure divided by economic measures) or environmental productivity (economic measures divided by environmental measures). The second is environmental improvement approaches, which focus on environmental cost-effectiveness (environmental measures divided by economic measures) or cost-environmental improvements (economic measures divided by environmental measures). The eco-efficiency metric is the environmental intensity metric: environmental impact (CO2) per sale. A decrease in the ratio of CO2 to sales implies a lower environmental intensity of the company, in other words, an improvement in its eco-efficiency.

Several studies have analysed the relationship between eco-efficiency and financial performance in the last two decades and obtained different results. Some of these studies

found better financial performance when companies integrate eco-efficiency into their operations. Guenster et al. (2011) observe higher financial ratios in portfolio analysis when the eco-efficiency of US firms is presented. In addition, (Pogutz & Russo, 2011) shows a positive relationship between environmental strategies by analysing greenhouse gas (GHG) emissions and short-term financial performance for companies listed on the Global Fortune 500 Index.

On the other hand, other researchers argue that strategies and actions that improve environmental performance counter financial objectives because reducing emissions generates costs and diverts resources from other strategic investments (Abeydeera et al., 2019).

Busch & Friede (2018) found that although there is evidence for a positive relationship between environmental performance and firms' financial performance, it is still unclear whether pollution prevention affects firms' financial performance or whether high-performing firms can provide environmental benefits. In this regard, microfinance studies generally analyse the effect of eco-efficiency or other environmental measures on firms' financial performance. Financial performance measures in the form of accounting metrics, market metrics, or a combination of the two can be used.

Suh et al. (2014) examined 272 firms in 16 industries in South Korea. Results show that firms in product and service-intensive industries tend to have higher eco-efficiency scores than those in raw material or chemical-intensive industries. In addition, most industries reveal no relationship between traditional financial performance metrics and eco-efficiency scores.

Guenster et al. (2011) found that eco-efficiency relates positively to operating performance and market value. They use return on assets (ROA) representing operating performance and profitability and Tobin's q (Q) proxies for a company's valuation.

Research by (Al-Najjar & Anfimiadou, 2012) investigates the link between eco-efficiency, environmental policy, and firm value in the United Kingdom (UK) from 1999 to 2008. This research reflects eco-efficiency as ISO 14001, an external environmental certification as the measure used by (Sinkin et al., 2008). Al-Najjar and Anfimiadou (2012) found that eco-efficient firms have higher market values than those lacking environmental strategies.

Sinkin et al. (2008) examine the proposition that adopting eco-efficient business strategies is associated with higher firm value. According to Sinkin, companies that adopt an eco-efficient business strategy can reduce costs and earn more profits. The market will appreciate this company more than similar companies that do not adopt an eco-efficient business strategy. Examining 431 firms, Sinkin found significant evidence that eco-efficient firms consistently have higher market values than a sample of non-eco-efficient firms.

Broadstock, Collins, Hunt, & Vergos (2018) examine the effect of company choice on environmental, social, and governance (ESG) strategic investment compliance on the company's level of eco-efficiency. Their findings show that adopting ESG choice of firms has a positive effect on the firm's level of eco-efficiency but only to a certain extent, after which the effect becomes negative.

Research by (Al-Najjar & Anfimiadou, 2012; Broadstock et al., 2018b; Busch & Friede, 2018; Guenster et al., 2011; Sinkin et al., 2008; Suh et al., 2014b) proves that eco-efficiency has a positive influence on the company, both on the performance and market value of the company. Although in research (Suh et al., 2014b), this effect does not occur in all company sectors. In addition, the eco-efficiency measure used in the research varies; some use the

application of ISO 14001 or external environmental awards. These measurements have not been able to capture the true meaning of eco-efficiency.

Although several studies have proven a positive effect of eco-efficiency, findings from Choi, Han, & Lee (2020) and Czerny and Letmathe (2017) prove the opposite. Choi, Han, & Lee (2020) conclude that positive environmental performance has a negative impact on stock price results and, in turn, on long-term financial returns and argues that investors consider environmental activities to be carried out at the cost of increasing future profits.

Czerny & Letmathe (2017) examine the relationship between the focus on environmental strategies and proactive GHG reductions related to improving environmental and economic performance. Czerny & Letmathe (2017) found no significant direct relationship between environmental and economic performance.

The theory of a natural resource-based view of the firm (NRBV) was first introduced by Hart (1995). According to Hart (1995), a firm's strategy and competitive advantage will be rooted in the capabilities that facilitate environmentally sustainable economic activity — a natural resource-based view of the firm (NRBV). The NRBV considers three key strategic capabilities: pollution prevention, product stewardship, and sustainable development. The NRBV also provides a theoretical mechanism by which links between environmental actions and profits can be established. The NRBV argues that the relationship between environmental strategy and competitive advantage depends on the form of environmental improvement, as the mechanisms are very different for pollution prevention.

Based on the theory of natural resource-based view (NRBV), the company will achieve a sustainable competitive advantage by reducing the negative impact of the company's operations on the environment by using a proactive strategy toward the environment. Sun et al. (2021) imply that environmental protection strategies such as raw materials and energy can reduce costs. Recent studies document that green product/process innovation reduces energy consumption and leads to competitive advantage and better organisational performance. The drivers of such innovation are big data, management commitment, green human resource management, and green transformational leadership (Bhatia, 2021; J.-W. Huang & Li, 2017).

This study uses the emission intensity-based CEP metric that captures the results of a proactive environmental strategy, namely an environmental strategy based on pollution prevention. Proactive strategies result in reduced energy consumption and emissions and ultimately reduced spending on electricity and fuel. Thus, this strategy is expected to reduce costs and increase financial benefits while preserving the natural environment. Low eco-efficiency figures indicate the company produces fewer emissions for each unit/monetary.

One methodological problem often raised is the lack of consistency in operationalising financial performance variables. The lack of uniformity in size is one reason for the inconsistent findings in the literature (Dixon-Fowler et al., 2013). Although competitive advantage resulting from reputational benefits from positive environmental performance, reduced risk perception, and meeting stakeholder needs can be reflected in market-based measures, according to Busch & Friede (2018) and D. Z. X. Huang (2021), accounting measures may be better indicators of efficiency and organisational capability. Therefore, following this suggestion, this study uses accounting-based measures to measure a company's financial performance – namely, return on assets (ROA), return on sales (ROS), and return on equity (ROE). The advantage of using an accounting-based measure is that it captures management's effectiveness in asset utilisation, plan implementation, and operations (Sudha, 2020). This study uses the three measures of company performance to strengthen the study's

results and provide additional evidence of the effect of eco-efficiency on the company's financial performance. For this reason, the following hypotheses were formulated for this study:

H $_1$: Eco-efficiency positively affects return on assets (ROA)

H $_2$: Eco-efficiency positively affects return on equity (ROE)

H $_3$: Eco-efficiency positively affects return on sales (ROS)

METHOD

This study analyses data for 2019 to 2021 with a sample of companies listed on the Indonesia Stock Exchange that have data related to eco-efficiency, namely emissions produced by companies. This research uses data starting in 2019 to identify the impact of the issuance of POJK number 51 of 2017, which regulates companies starting to implement sustainability initiatives starting in 2019. The research population is all companies listed on the Indonesia Stock Exchange for 2019 – 2021. This study excludes financial companies because financial companies have different characteristics from non-financial companies. Based on the availability of data related to eco-efficiency measurements, namely, emissions produced by companies, the study's final sample was 48 companies that consistently had the data in question. So in total, this study has 144 units of analysis. The following are the criteria for this research sample.

Criteria	Unit
Companies that prepare Sustainability Reports	102
Companies that do not consistently prepare 2019-2020 sustainability reports	40
Companies with incomplete data	14
Sample Company	48

Table 1. Sample Criteria

Code	Variable	Measurement
ROA	Return on Asset	Profit after taxes (PAT) scaled by total assets.
ROE	Return on Equity	PAT divided by paid-up equity share capital
ROS	Return on Sales	PAT divided by total sales
ECO	Emissions Intensity	Metric tons of CO2 emissions per year divided by sales (millions of rupiah)
SIZE	Firm size (Control Variable)	natural logarithm of total assets
LEV	Leverage (Control Variable)	total debt scaled by total assets

Table 2. Research Variables

Regression will be carried out for each measure of the company's financial performance (ROA, ROE, and ROS) with independent and control variables ECO, SIZE, and LEV. Firm size and leverage are used as control variables in this study. Firm size is a significant control variable because larger firms may have greater resources for social investment, placing more significant pressure on firms to engage or not engage in socially responsible activities (Margolis et al., 2009). Many studies have consistently proven that company size and leverage are variables that affect the company's financial performance (Ali et al., 2017; Andries & Stephan, 2019; Boussenna, 2020; Danso et al., 2020; Meutia et al., 2021; Yusof et al., 2020).

Furthermore, to test the hypothesis, the following model is formulated to examine the effect of Eco-efficiency on the company's financial performance (ROA, ROE, ROS).

$$ROA_{it} = \alpha_i + \beta 0\ ECO_{it} + \beta 2\ SIZE_{it} + \beta 3 LEV_{it} + \in_{it} \ldots\ldots\ldots\ldots\ldots (1)$$

$$ROE_{it} = \alpha_i + \beta 0\ ECO_{it} + \beta 2\ SIZE_{it} + \beta 3 LEV_{it} + \in_{it} \ldots\ldots\ldots\ldots\ldots (2)$$

$$ROS_{it} = \alpha_i + \beta 0\ ECO_{it} + \beta 2\ SIZE_{it} + \beta 3 LEV_{it} + \in_{it} \ldots\ldots\ldots\ldots\ldots (3)$$

This study uses a panel data regression model –either the Least Squares Dummy Variable (LSDV) model or the Random Effects (RE) model. It is a cross-sectional time series with firm-level data covering three years from 2019 to 2011. LSDV is a form of fixed effect (FE) model. The Hausman test is used to decide between the feasibility of using the FE or RE model and; the null hypothesis using the RE model. If Hausman's test is invalid, the Breusch-Pagan Lagrange Multiplier (BP-LM) test is used to decide between the simple combined OLS regression or the RE model. The mean-variance inflation factor (VIF) is 1.57, which is within the acceptable range (VIF < 5), implying that there is no multicollinearity in the research model.

RESULT AND DISCUSSION

There are 144 samples from 9 sectors listed on the Indonesia Stock Exchange. Table 3 shows the number of samples per sector in this study. Of the 144 samples of companies that compile sustainability reports, 33.3 per cent came from the energy sector, followed by the basic materials sector with 20.8 per cent and the consumer non-cyclical sector with 16.7 per cent. The number of energy sectors that disclose data related to CO2 emissions indicates a better level of awareness in this sector in disclosing the emissions it produces. In several other sectors, such as transportation and logistics, health, and consumer cyclical, very few companies have or disclose data on the CO2 emissions they produce.

No	Sectors	Sample	Percentage
1	Basic Materials	30	20,8%
2	Consumer Cyclicals	6	4,2%
3	Consumer Non-Cyclicals	24	16,7%
4	Energy	48	33,3%
5	Healthcare	6	4,2%
6	Industrials	12	8,3%
7	Infrastructure	9	6,3%
8	Property	6	4,2%
9	Transportation and Logistic	3	2,1%
	Total	144	100,0%

Table 3. Sample by Sectors

Table 4 shows the average value of eco-efficiency by sector. The property sector has the highest emission eco-efficiency value compared to other sectors (15.23098). Meanwhile, the healthcare sector has the lowest eco-efficiency at 0.003624. This figure shows that per one million rupiahs of sales generated by companies in the health sector produce 0.003624 tons of CO2 emissions. Declining sales may influence the high number of eco-efficiencies in the property sector during the COVID-19 pandemic. At the same time, the cost of using and maintaining offices remains high, which results in high energy use that produces emissions. On the other hand, the health sector is a sector whose sales increased significantly during the Covid-19 pandemic, showing low eco-efficiency.

In addition to the health sector, basic materials and energy are two sectors that produce relatively high emissions (0.54128 and 0.32868). The Basic material is a group of companies that produce products that become raw materials for other companies. Included in this category are cement and mining companies. Meanwhile, the energy sector includes companies that sell products and services related to energy extraction, including non-renewable energy such as mining oil, natural gas, and coal, and companies that provide services to support these industries. These two sectors are considered more significant emitters than others (Changwichan et al., 2018; Liu et al., 2021; Shah et al., 2020).

No	Sectors	Eco-Efficiency
1	Basic Materials	0,54128
2	Consumer Cyclicals	0,19665
3	Consumer Non-Cyclicals	0,15785
4	Energy	0,32868
5	Healthcare	0,00362
6	Industrials	0,03860
7	Infrastructure	0,15957
8	Property	15,23098*
9	Transportation and Logistic	0,00410

Table 4. Eco-Efficiency per sector

Source: processed data

Statistic	ECO[1]	ROA[2]	ROE[3]	ROS[4]	DER[5]	Ln TA[6]
Mean	0,905	0,076	0,177	0,159	1,371	29,259
Std. Deviation	5,012	0,156	0,443	0,268	2,332	3,345
Skewness	8,338	7,682	6,211	2,187	7,594	-1,431
Kurtosis	73,783	74,250	47,047	29,963	72,856	1,921

Table 5. Descriptive Statistic

Source: processed data

Table 5 shows the descriptive statistical values for each research variable consisting of the mean, standard deviation, skewness and kurtosis.

Furthermore, Tables 6 - 8 show the regression estimation results using ROA, ROE, and ROS as dependent variables. Table 6 shows the perimeter estimation using ROA as the dependent variable. The BP-LM statistical test shows that the random effect model is the more appropriate. Based on the random effect model, eco-efficiency negatively and significantly affects ROA at the 1% level. This finding means that a decrease of 1 unit in the eco-efficiency number (which indicates that the company produces fewer emissions) will increase the ROA by 0.052 units. Meanwhile, the DER variable shows a negative and significant effect on financial performance in contrast to Ln TA, which has a positive effect.

Table 6. Effect of Eco-efficiency on ROA

Dependent variable: ROA	**LSDV model**		**Random effects model**
Variables	1	2	3
ECO	-0,152***	-0.1461***	-0.052***
	(-6,19)	(-5,94)	(-5,13)
DER	-0.2240***	-0.2234***	-0.2243***
Ln TA	0,0008	0,0018	0.0027***
Hausman test statistic			0
Prob > χ2			1
BP-LM test statistic			
Prob > χ2			0
R2	0,4062	0,4207	0,3693
N	144	144	144

Note(s): (1) ***p ≤ 0.01, **p ≤ 0.05, *p ≤ 0.10; (2) Robust t-values in parentheses in models 1 and 2. (3) Robust
z-values in parentheses in model 3

Table 7. Effect of Eco-efficiency on ROE

Dependent variable: ROE	**LSDV model**		**Random effects model**
Variables	1	2	3
ECO	-0,0078	-0.0081***	-0.009***
	-0,12		
DER	-0.1240***	-0.1234***	0.114***
Ln TA	-0,0028	-0,0021	-0.0027***
Hausman test statistic			0
Prob> χ2		0	1
BP-LM test statistic			7,75
Prob> χ2			0,005
R2	0,1365	0,1472	0,1248
N	144	144	144

Note(s): (1) ***p ≤ 0.01, **p ≤ 0.05, *p ≤ 0.10; (2) Robust t-values in parentheses in models 1 and 2. (3) Robust
z-values in parentheses in model 3

Dependent variable: ROS	**LSDV model**		**Random effects model**
Variables	1	2	3
ECO	-0,152***	-0.1461***	-0.1175***
DER	-0.2240**	-0.2234**	-0.2243**
Ln TA	-0,0008	-0,0018	-0.0027**
Hausman test statistic			18,16
Prob> $\chi 2$			0,011
BP-LM test statistic			8,64
Prob> $\chi 2$			0,003
R2	0,09	0,1	0,065
N	144	144	144

Table 8. Effect of Eco-efficiency on ROS

Note(s): (1) ***p ≤ 0.01, **p ≤ 0.05, *p ≤ 0.10; (2) Robust t-values in parentheses in models 1 and 2. (3) Robust

z-values in parentheses in model 3

Table 7 shows the regression results using ROE as the dependent variable. BP-LM statistics show that the RE model is suitable. The RE model proves that the ECO variable affects ROE negatively and significantly at the 1% level. It can be interpreted that a decrease of 1 unit of ECO (which indicates that the company produces lower emissions) will cause an average ROE to increase by 0.009. The two control variables, both AND and LnTA, have a negative effect on ROE, the opposite result when using ROA as the dependent variable.

Furthermore, table 8 reports the regression results using the ROS variable as the dependent variable.

The FE model is appropriate because the Hausman test statistic shows a significant number. Based on the LSDV model, Eco-Efficiency negatively affects ROS at the 1% level. Figures in Table 7 indicate that a decrease in Eco-efficiency (Emissions) of 1 unit will cause ROS to increase by 0.152. This analysis also proves that both DER and Total Assets have a negative effect on ROS.

This finding proves that in all cases, eco-efficiency (emissions intensity) positively impacts the company's financial performance as measured by the three measures (ROA, ROE, and ROS). This finding indicates that companies that produce fewer emissions can generate better profits. Thus the hypothesis in this study is proven. This finding aligns with Czerny & Letmathe (2017), Guenther et al (2016), Porter & Linde (1995),and Sinkin et al (2008). This study shows a consistent effect of eco-efficiency on the financial performance of companies with accounting measures and performance measurements with market measures. This confirms that the company's sustainability initiatives can improve management and market performance, as found by previous research. Emissions generated by the company indicate

the company's sustainability initiatives in the form of activities aimed at reducing company emissions. Activities carried out by companies to reduce emissions will impact increasing company returns. This is possible because emission reductions are usually the result of energy consumption policies by companies. In the long term, this energy consumption policy will produce cost efficiencies and increase company returns.

In addition, these findings support the theory of the natural resource-based view (NRBV); the company will achieve a sustainable competitive advantage by reducing the negative impact of the company's operations on the environment by using a proactive strategy toward the environment. Besides increasing economic value, eco-efficiency reduces environmental impacts (Suh et al., 2014a). The findings of this study support the statement by (Guenster et al., 2011) that managers need not worry too much that pro-environmental policies will conflict with the company's financial goals.

CONCLUSION

This study aims to identify the effect of eco-efficiency as measured by emission intensity on the company's financial performance as measured by three different measures: ROA, ROE and ROS. This study proves that in all cases, eco-efficiency (emissions intensity) positively impacts the company's financial performance as measured by the three measures (ROA, ROE, and ROS). This finding indicates that companies that produce fewer emissions can generate better profits.

This study cannot be separated from several limitations, including the small sample of companies that disclose data on the emissions produced. Although many companies have prepared sustainability reports, not all companies disclose data on the emissions they produce.

Another limitation is that this study analyses all companies without differentiating the company sector. Since there may be differences in the type and characteristics of companies by sector that can affect the company's sustainability policy, future research can identify eco-efficiency by sector to get better results.

This research has good implications for businesses, especially those implementing sustainability initiatives. This study supports the natural resource-based view (NRBV) theory. Companies will achieve a sustainable competitive advantage by reducing the negative impact of the company's operations on the environment by using a proactive strategy for the environment.

Further research can expand by measuring eco-efficiency based on emissions and other eco-efficiency indicators such as energy, raw materials, water, and waste generated so that a complete picture will be obtained regarding the impact of sustainability initiatives carried out by the company.

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