



The Effect Of Eco-Efficiency, Green Innovation, And Sustainability Performance On Firm Value

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ABSTRACT

This study aims to determine the impact of eco-efficiency, green innovation and sustainability performance on firm value with a sample of companies listed on the Indonesia Stock Exchange for the 2020-2023 period in the food and beverage sector. The population is 125 companies, a sample of 33 companies was obtained. The technique used in sampling is non-probability sampling with a purposive sampling type. Firm value is proxied by Tobin's Q. Content analysis as an indicator of measuring the company's sustainability performance variables disclosed in the Annual Report and Sustainability Report, and ownership of ISO 14001 certification as an indicator of measuring the eco-efficiency variable. The analysis technique used is multiple linear regression analysis of panel data. The results of the study show that eco-efficiency and sustainable performance have a significant effect on company value. Meanwhile, green innovation does not have a significant effect on firm value.

INTRODUCTION

Environmental issues have encouraged companies to be more environmentally responsible (Olateju et al., 2021). The growth of advanced industries is comparable to the increasing pollution generated from industrial production processes, such as waste that can increase air and water pollution to dangerous levels (Agustia, Sawarjuwono, and Dianawati 2019). Global climate change is influenced by environmental awareness due to industrial activities (Agustia, Sawarjuwono, and Dianawati 2019). Thus, the company's attention is currently not only focused on quality, service, and cost. The company has added social and environmental performance (Brady et al., 1999). Reducing environmental impacts and restoring ecosystems pose a great need for corporate resources. To overcome this, the Indonesian government has tightened Environmental Law No. 46 of 2017 concerning Environmental Economic Instruments, the Government Regulation on the Environment, and the Presidential Regulation. Therefore, corporate expenditure must be taken into account, involvement in the restoration process initiates the emergence of eco-efficiency. Eco-efficiency can be implemented as an environmental management system in managing corporate resources. Eco-efficiency is an

abbreviation for "ecological economic efficiency" which is a construct that shows increased productivity that will simultaneously reduce costs with improved environmental performance (Meutia, Ramadhani, and Adam 2019). The concept of eco-efficiency is a midpoint between the economy and the environment which is the company's main strategy for assessing and improving the environmental performance of products and services (Bashiru Mahmud et al., 2022).

Green innovation as a company activity in creating new products that are environmentally friendly and have competitive advantages (Dai and Xue 2022); (Liu and Zhang 2017) and minimize environmental impacts (Damas et al., 2021); (Rahelliamelinda et al. 2024); (Ma, Hou, and Xin 2017). From a general perspective, environmental performance means implementing sustainability that guarantees the environment: water, land, water, and ecosystems. Environmental performance is a company's effort to increase stakeholder and shareholder value. So, in addition to environmental performance, eco-efficiency and green innovation are expected to increase the company's value (Damas et al., 2021).

Regarding sustainability performance, companies have responsibilities for aspects related to operational activities from waste, environmental pollution, product safety, and employee welfare (Dwicahyanti and Hero, 2021). Investors believe that every effort to improve social and environmental performance impacts reducing shareholder value. A different opinion is expressed that how to improve social and environmental performance will increase the efficiency of the company's output (Porter and Van Der Linde, 2017). Company value is a ratio related to the assessment of the performance of company shares listed on the capital market. The implementation of environmental strategies is able to bridge environmental and economic interests so that they synergize to increase company value (Agustia et al., 2019). Company value is built on public perception even though it is directed at investor interests (James A. Ohlson, 1995); (Indra Lekso Wibowo Putra et al., 2019). Currently, many investors have begun to consider investing in companies that are environmentally responsible (Damas, Maghviroh, and Meidiyah 2021). However, there is debate about whether increasing environmental performance will reduce shareholder value which will have an impact on company value. Efforts to combat climate change can reduce shareholder wealth due to commitments to environmental protection (Agustia et al., 2019). This is because the cost of companies that comply with ethical standards by implementing an environmental management system will result in higher costs which will put the company in a less profitable position in the industry and reduce shareholder wealth (Panggau and Aditya Septiani 2017). Previous research found eco-efficiency as a business strategy that influences company value (Sinkin et al., 2008). Research shows that companies that have implemented eco-efficiency in their operational activities can maintain stock prices, increase profits, and have higher company values than companies that do not implement this policy (Sinkin, Wright, and Burnett 2008). Meanwhile, other researchers found that eco-efficiency has a negative impact arising from the environmental management system which will reduce shareholder value where the manager's goals are contrary to stakeholders, especially investors (Damas et al, 2021). Green innovation has been found to be able to prevent stakeholder trust gaps ((Rahelliamelinda et al., 2024); (Cahyaningtyas, Isnaini, and Ramadhani, 2022); (Husnaini and Tjahjadi, 2021). Green innovation helps companies reduce environmental problems during the production process, in the form of increasing resource productivity, energy efficiency, and reducing pollution (Ma, Hou, and Xin 2017). Meanwhile, other studies have found that green innovations pursued by companies are only a small part of the considerations for investment decisions and product purchases. Companies have not been able to reduce the use of energy and non-renewable materials and the public has not cared about environmentally friendly products, people only choose products based on their needs. Sustainability performance is considered an agency cost because it can be used to serve managerial personal interests. Sustainability performance can increase company value by strengthening the company's

relationship with stakeholders (Jihan Fairus and Ety Murwaningsari, 2023). Other findings reveal that the company's sustainability performance has a significant inverse effect on company value.

LITERATURE REVIEW

Stakeholder Theory

Stakeholder theory defines stakeholders as a community that cannot be separated from business value creation activities (Freeman, 1994); (Roberts 1992); (Freeman, Wicks, and Parmar, 2004). The objectives of stakeholder theory focus on 2 core issues (Freeman, 1994). First, by knowing the company's goals, managers can assess their performance and their relationship with stakeholders. Second, trying to find out management's responsibilities to stakeholders. Managers must develop relationships so that stakeholders are motivated to give their best to create company value (Freeman, 1994); (Donaldson and Preston, 1995); (Aggarwal, 2013). Companies cannot operate only for their interests, instead, companies must strive to serve stakeholders. Stakeholder theory states that companies are expected to be able to help and benefit stakeholders (Albastiah and Sisdianto, 2022). Stakeholder theory also supports stakeholder relationships and corporate sustainability performance to increase corporate value. Corporate sustainability performance supports wealth maximization based on the creation of shared benefits for all stakeholders (Hörisch et al., 2014).

Legitimacy Theory

Legitimacy theory is a social contract with society to use economic resources in an effort to gain trust (Jihan Fairus and Ety Murwaningsari, 2023). Legitimacy theory provides an understanding of companies in implementing environmental and social disclosures (Mousa et al., 2015). In this regard, disclosure of information related to the company's sustainability performance is only optional, managers will provide information only on the positive aspects of the company's performance, to show the desired corporate image in public opinion. Therefore, it is necessary to disclose information related to the company's sustainability performance from the competent authorities as an obligation (Mousa et al., 2015). Legitimacy theory encourages companies to implement responsible business development through eco-efficiency and green innovation activities (Olateju et al., 2021); (Dai and Xue, 2022). The aim is to change the public perception that the company's operational activities do not pose a threat to the environment and resources (Panggau and Aditya Septiani, 2017).

Firm Value

Firm value is the investor's perception of the company's success related to stock prices (Rahelliamelinda et al., 2024). Public companies tend to maintain or increase their firm value because it shows the company's performance which can influence stakeholders' perceptions, especially investors. Investors are adding Economic, Social, and Governance (ESG) performance, green innovation, and ecoefficiency to their investment considerations as material for assessing companies. Although the size of the firm value is directed at the interests of investors, the company's value is also built on public perception. This firm value can be proxied by Tobin's Q ratio which is the market value of the company's assets divided by the replacement cost of the company's assets.

Eco-Efficiency

The success of a company in responding to environmental issues is a competitive advantage (Che-Ahmad and Osazuwa, 2016); (Amalia et al., 2017). The involvement of eco-efficiency as a business strategy has a positive relationship with company value. The implementation of eco-efficiency can meet the interests of stakeholders and not sacrifice the interests of shareholders. Several studies have found that eco-efficiency has a positive effect on

company value (Dewi and Rahmianingsih, 2020); (Wusono and Matusin, 2019). Several different opinions reveal that eco-efficiency hurts company value (Damas et al., 2021) research using moderation variables (Rahelliamelinda et al. 2024); (Panggau and Aditya Septiani 2017); (Septianingrum, 2022). The negative impact arises from the environmental management system that will reduce shareholder value where the manager's goals are contrary to stakeholders, especially investors (Rahelliamelinda et al. 2024); (Panggau and Aditya Septiani, 2017). This is because the costs incurred for the environment can reduce the level of profitability and returns for investors (Che-Ahmad and Osazuwa, 2016).

- H1 : Eco-efficiency has a positive effect on firm value.

Green Innovation

Green innovation is a process, technique, system, or new product that is modified to reduce the risk of environmental damage (Dai and Xue, 2022); (Cahyaningtyas, Isnaini, and Ramadhani, 2022); (Ma, Hou, and Xin 2017); (Liu and Zhang, 2017). Several studies have found that green innovation products have a negative impact and do not affect firm value (Damas et al., 2021); (Rahelliamelinda et al., 2024); (Ma, Hou, and Xin, 2017). Environmentally friendly innovation has been attempted by companies not to be used as the main decision to invest. Several researchers have found that green innovation has a positive effect on company value (Rahelliamelinda et al., 2024); (Cahyaningtyas, Isnaini, and Ramadhani, 2022); (Husnaini and Tjahjadi, 2021). Environmentally friendly product innovation seeks to prevent gaps in stakeholders. It is expected to create the existence and sustainability of the company by implementing the values or norms that exist in the community (O'Donovan, 2002). One of them is that companies can implement green innovation to minimize the negative environmental impacts so that they can increase the firm value.

- H2 : Green Innovation has a positive effect on firm value.

Corporate Sustainability Performance

A large number of international standard guidelines have been developed to facilitate reporting and performance assessment towards the triple bottom line, namely the Global Reporting Initiative (GRI), The United Nations Global Compact (UNGC), United Nations Environment Program (UNEP). Among these guidelines, GRI is the most popular and widely used method in research (Hussain 2015). Corporate sustainability performance is considered as an agency cost, to increase corporate value (Liu and Zhang, 2017). The components of governance, environment, employees, and society have a positive influence on corporate value (Dahlia Pinem and Sindi Aulia, 2023). Disclosure of corporate sustainability performance is expected to provide a positive signal to external parties of the company (Bashiru Mahmud et al., 2022). Several studies have found a positive effect of corporate sustainability performance on firm value (Liu and Zhang, 2017); (Jitmaneroj, 2018). The components of corporate sustainability performance are significantly responsible for increasing corporate value (Laskar and Gopal Maji, 2018). Other researchers found that corporate sustainability performance has a significant inverse effect on firm value (Jihan Fairus et al., 2023). This does not mean that organizations should ignore the principles of corporate sustainability (Nasseri, 2019); (Jihan Fairus et al., 2023).

- H3 : The company's sustainability performance has a positive effect on the firm value.

METHODS

This study uses a quantitative approach, with a causality approach to analyze the determinants of the impact of eco-efficiency, green innovation, and sustainability performance on firm value. The data used in the study are secondary data that refer to information obtained from existing sources in the form of financial reports, annual reports, and company sustainability reports according to the research sample criteria. Data were obtained through the

Indonesia Stock Exchange (IDX) website, namely <https://www.idx.co.id/id>, and the company website. The research population is companies in the food and beverage sector listed on the Indonesia Stock Exchange for the 2020-2023 period totaling 125 companies. The sampling technique uses nonprobability sampling with a purposive sampling type so that a total of 33 companies are obtained. The dependent variable is the company's value measured by the Tobins Q ratio scale. If the ratio value is more than 1, it indicates that investment in assets generates higher profits than its investment expenditure. The first independent variable eco-efficiency is a concept that encourages companies to create products that have more value and do not hurt the environment, resource use, and company expenses simultaneously. Eco-efficiency is measured using a dummy value of "1" for eco-efficient companies and "0" for non-eco-efficient companies. The ISO 14001 standard is a specification document or requirement for the Environmental Management System (Wusono and Matusin 2019).

The implementation of ISO 14001 can reduce the impact on the environment, encourage the efficiency of all business processes, increase competitiveness, and build a positive image of the company towards stakeholders, namely the government, entrepreneurs, and the community (Wusono and Matusin 2019). The second independent variable, namely green innovation, is a novelty carried out by the company related to the environmentally friendly product process that can improve the company's economic performance and environmental performance (Rahelliamelinda et al., 2024); (Oduro et al., 2022). The measurement of green innovation uses 8 components of the Green Innovation content analysis checklist developed by Setyawan and Wijayanti (2023) by giving a value of "1" if disclosed and a value of "0" if not disclosed. The third independent variable of corporate sustainability performance is a dynamic way of using sustainability practices and involving stakeholders to achieve shareholder goals (Aksoy et al., 2020). Measuring sustainability performance by analyzing annual reports and sustainability reports using content analysis to analyze the disclosure of 28 components by giving a value of "1" if disclosed and a value of "0" if not disclosed (Nasseri, 2019). Profitability control variables are a description of the company's performance in using resources to gain profit (Widyastuti et al., 2022). Profitability is measured by Return on Assets (ROA). Leverage is a ratio to measure how much a company manages the use of funding from debt (Che-Ahmad and Osazuwa, 2016); (Cheng and Tzeng. 2011). Company age is how long a company has been established. Companies that have been established for a long time will affect performance because the company already has business experience and can improve performance (Kinesti et al., 2020).

RESULTS

Descriptive statistical analysis is used to provide an overview of the research variables. The calculations used in this study are the maximum, minimum, and average values. Table 1 is the descriptive statistics of the variables used in the study:

Table 1 Descriptive Statistics

	Y	C	EE	GI	KK	ROA	LEV	UP
Mean	1.237273	1.000000	0.964000	0.917455	0.933091	0.919455	0.934321	0.915450
Median	1.100001	1.000021	1.000000	0.930000	0.910000	0.941000	0.920100	0.933000
Maximum	2.900000	1.000000	1.000011	1.002000	1.001100	1.000000	1.000022	1.000111
Minimum	0.700000	1.000000	0.730000	0.710000	0.640000	0.720000	1.000211	1.000221
Std.Dev	0.405453	0.000000	0.070245	0.057620	0.094303	0.066066	0.405421	0.405422
Observations	132	132	132	132	132	132	132	132

Source: Processed Data, 2024

Table 2 Chow Test Results

Effects Test	Statistic	d.f.	Prob.
Cross-section F	8.787041	(6.80)	0.0000

Source: Processed Data, 2024

Table 2 shows the probability of the cross-section F of $0.00 < 0.05$, which is greater than 0.05, meaning H_0 is rejected and H_1 is accepted. Based on these results, the selected model is the Fixed Effect model.

Table 3 Hausman Test Results

Test Summary	Chi.Sq.Statistic	Chi-Sq.d.f	Prob.
Cross-section random	9.424531	3	0.0742

Source: Processed Data, 2024

Table 3 shows the results of the Hausman test stating that the probability of a random cross-section is $0.0742 > 0.05$, then H_0 is accepted and H_1 is rejected. So the right model obtained in this study is the Random Effect Model.

Table 5 Panel Data Regression Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.062588	0.175764	0.356687	0.7208
EE	0.528412	0.188444	2.801916	0.0047
GI	0.143111	0.174017	0.822411	0.4130
KK	0.524478	0.219672	2.386875	0.0171
ROA	0.182535	0.178882	1.020287	0.3080
LEV	0.143024	0.175454	2.801915	0.3077
UP	0.527712	0.165425	2.701811	0.0036

Source: Processed Data, 2024

The results of the regression test in table 5 are stated in the regression equation:

$$Y = 0.0625 + 0.5284 + 0.1431 + 0.5244 + 0.1825 + 0.1430 + 0.5277 + e$$

Table 6 T-Test Results

Variable	Coefficient	Std Error	t-Statistic	Prob.
C	0.062698	0.175774	0.356697	0.7118
EE	0.528316	0.188554	2.800926	0.0057
GI	0.143111	0.174021	0.822421	0.4120
KK	0.524570	0.219772	2.386885	0.0171
ROA	0.182525	0.178894	2.120297	0.3090
LEV	0.544316	0.141554	2.386885	0.0681
UP	0.521270	0.226772	2.226885	0.0120

Source: Processed Data, 2024

Based on the table above, the results of the t-test for the Tobins q proxy are as follows:

1. The effect of eco-efficiency on firm value (Tobins Q). The table above shows the eco-efficiency value (X_1) which is $0.0057 < 0.05$ with a coefficient of 0.528316 and a calculated t value of $2.800926 >$ than the t table of 1.97490. This means that eco-efficiency affects firm value.
2. The effect of green innovation on firm value (Tobins Q). The table above shows the value of green innovation (X_2) which is $0.4120 > 0.05$ with a coefficient of 0.143111 and a calculated t

- value of 0.822421 < than t table 1.97490. This means that green innovation does not affect firm value.
3. The effect of sustainability performance on firm value (Tobins Q). The table above shows the value of sustainability performance (X_3) which is 0.0171 < 0.05 with a coefficient of 0.528316 and a calculated t value of 2.386885 > than the t table of 1.97490. This means that eco-efficiency affects firm value.
 4. The Effect of Profitability on firm value (Tobins Q). The table above shows the profitability value (X_4) which is 0.3090 > 0.05 with a coefficient of 0.182525 and a calculated t value of 2.120297 < than t table 1.97490. This means that profitability does not affect firm value.
 5. The effect of leverage on firm V alue (Tobins Q). The table above shows the leverage value (X_5) which is 0.0681 > 0.05 with a coefficient of 0.544316 and a calculated t value of 2.3868 < than t table 1.97490. This means that leverage does not affect firm value
 6. The effect of company age on firm value (Tobins Q). The table above shows the value of company age (X_6) which is 0.0120 < 0.05 with a coefficient of 0.521270 and a calculated t value of 2.226885 > than the t table of 1.97490. This means that company age affects firm value.

Table 7 F Test

Hasil Uji F			
R-squared	0.224118	Mean dependent var	0.414822
Adjusted R-squared	0.201171	S.D.dependen var	0.185292
S.E of regression	0.162127	Sum squared resid	4.635361
F-statistic	1.231124	Durbin-Watson stat	0.837025
Prob (F-statistic)	0.000000		

Source: Processed Data, 2024

Based on the calculation results above, it can be seen that the F value is 1.231124 with a probability of 0.00000 which is less than the significance level of 0.05. So it can be concluded that the variables of community components, employee components, environmental components, and corporate governance components simultaneously influence firm value.

DISCUSSION

Eco-Efficiency Affects Firm Value

Based on Table 5, the results of the study show that the eco-efficiency variable proxied using ISO 14001 environmental management certification affects company value. This can be seen from the coefficient value of the eco-efficiency variable of 0.528412 with a probability of sig value of 0.0047 < 0.05. Therefore, H0 is rejected and H1 is accepted, meaning that eco-efficiency affects firm value. Companies that implement eco-efficiency can increase company value. Eco-efficiency encourages companies to innovate products that have more value while minimizing negative impacts on the environment, resource use, and costs simultaneously.

The results of this study are in line with Amalia (2017); Jihan Fairus et al., (2023) argue that companies that have adopted eco-efficiency in the company's operational activities will increase company profits and have a higher company value than companies that do not implement eco-efficiency. The ISO 14001 certificate shows that the company has fulfilled its obligations to the environment, so the market responds significantly to the ISO 14001 certificate.

Osazuwa and Che-Ahmad (2016) stated that there is an influence of eco-efficiency on firm value. Shareholders have a very important role in determining the value of the company. Investors who invest in eco-efficient companies can increase economic value. According to stakeholder theory to create value for the company, managers must develop relationships that motivate stakeholders and create a conducive environment (Freeman et al., 2004).. If the demand for socially responsible investment opportunities generated by investors exceeds the

supply of investment opportunities, then the investment can increase the economic value of the company. Furthermore, reducing internal costs such as environmental costs will only lead to higher external costs such as bondholder payments because the company may be considered to have a higher risk that can reduce the firm value.

Green Innovation Affects Firm Value

Based on Table 5, the coefficient value of the green innovation variable is 0.143111 with a probability value of sig 0.4130 > 0.05. So, if H0 is accepted and H2 is rejected, green innovation does not have a significant effect on firm value. The presence or absence of green innovation does not affect firm value. The test results are contrary to the previously proposed hypothesis, namely that green innovation has a positive effect on firm value so H2 is rejected.

The results of this study are in line with the research of Damas et al., (2021); Rahelliamelinda et al. (2024); Ma, Hou, and Xin, (2017) which stated that green innovation does not affect firm value. The research results obtained do not show any relevance between green innovation and firm value. Environmentally friendly innovation carried out by companies is only a small part of the considerations that influence investment decisions and product purchases. Companies cannot reduce the use of energy and non-renewable materials significantly because the industry is closely related to environmental issues. In addition, people do not care about environmentally friendly products because their focus is only on meeting needs when choosing products. The test results obtained have not been able to prove the legitimacy theory. This happens because there are still many companies that consider environmentally friendly innovation to be a form of compliance. The results of this study differ from the research of Cahyaningtyas et al., (2022); Husnaini and Tjahjadi (2021) which revealed that green innovation has a positive effect on firm value.

The Influence Of Corporate Sustainability Performance On Firm Value

Based on Table 5, the coefficient value of the company's sustainability performance variable is 0.524478 with a probability value of sig. 0.0171 < 0.05. So, H3 is accepted, meaning that the company's sustainability performance affects the company's value. This is in line with Liu and Zhang (2017); Jitmaneroj (2018); Laskar and Gopal Maji (2018). Disclosure of the company's sustainability performance can increase transparency and stakeholder trust (Laskar and Gopal Maji., 2018). The company's sustainability performance is an agency cost, to increase the company's value (Liu and Zhang, 2017).

Theoretically, reporting corporate sustainability performance can be very effective in creating firm value. The relationship is expected to be valid only if the company discloses its sustainability-related activities very accurately and objectively. The positive impact of corporate sustainability performance is that the company will provide full support to the community. This affects the public's assessment of the company and has an impact on the financial index and firm value. The company's responsibility to employees is fulfilled both in terms of employee safety and welfare. The company's concern for environmental components and governance will be fulfilled and carried out by applicable regulations. This will affect the firm value. Disclosure of information related to corporate sustainability performance is optional, managers will be willing to provide corporate performance information. This can show the company's image to the public which can increase the firm value.

CONCLUSION

Based on the results of the study and discussion on how eco-efficiency, green innovation, and sustainability performance affect firm value. Thus, it is concluded that eco-efficiency has a significant effect on firm value. Companies that implement eco-efficiency can provide confidence to investors that the company can maintain and preserve the environment. Thus, the firm has a

good image that affects stock prices and increases firm value. Green innovation does not affect firm value, the results of the study do not show any relevance between green innovation and firm value. Environmentally friendly innovation carried out by the firm is only a small part of the considerations that influence investment decisions and product purchases. Sustainability performance affects firm value. Disclosure of the company's sustainability performance will increase transparency and provide trust to stakeholders. Theoretically, reporting the company's sustainability performance is very effective in creating firm value.

LIMITATION

This study has limitations in the use of indicators on the company's sustainability performance using previous measurements so there may be changes in indicators according to current environmental conditions. Theoretically, for further research, it is hoped that it can increase the number of research samples and expand the indicators used in the study. In addition, it is hoped that further research can provide variations with the use of other independent variables and consider other measurement methods for eco-efficiency, green innovation, and sustainability performance variables to reduce subjectivity and better results. So that diverse research is produced and is expected to add insight to other readers.

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