

# The Effect of Carbon Emission Disclosure, Corporate Social Responsibility Disclosure, and Eco-efficiency on Firm Value

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## ABSTRACT

Economic growth in recent years has shown rapid improvement in the industrial sector. This progress has given rise to various environmental problems, including increased carbon emissions and global warming due to industrial activities. The purpose of this study is to examine and analyze the effect of Carbon emission disclosure, CSR Disclosure, and Eco-efficiency on Firm Value. The sample for this study was selected using purposive sampling, resulting in 19 companies in the Basic Materials Manufacturing Sub-Sector during the 2021-2024 period with a total of 76 data points. The data analysis technique used multiple linear regression. The results show that Carbon emission disclosure and CSR Disclosure do not affect firm value. Meanwhile, Eco-efficiency has a significant positive effect on firm value.

Keywords: *Carbon Emission Disclosure; Corporate Social Responsibility Disclosure; Eco-Efficiency; Firm Value*

***Pengaruh Pengungkapan Karbon, Pengungkapan Tanggung Jawab Sosial Perusahaan, dan Eko-efisiensi terhadap Nilai Perusahaan.***

## ABSTRAK

Pertumbuhan ekonomi dalam beberapa tahun terakhir menunjukkan peningkatan yang pesat pada sektor industri. Kemajuan ini menimbulkan berbagai permasalahan lingkungan, termasuk meningkatnya emisi karbon dan pemanasan global akibat aktivitas industri. Penelitian ini bertujuan untuk menguji dan menganalisis pengaruh carbon emission disclosure, CSR disclosure, dan eco-efficiency terhadap nilai perusahaan. Sampel penelitian dipilih menggunakan metode purposive sampling, sehingga diperoleh 19 perusahaan pada subsektor manufaktur bahan dasar selama periode 2021–2024 dengan total 76 data observasi. Teknik analisis data yang digunakan adalah regresi linear berganda. Hasil penelitian menunjukkan bahwa carbon emission disclosure dan CSR disclosure tidak berpengaruh terhadap nilai perusahaan. Sementara itu, eco-efficiency memiliki pengaruh positif yang signifikan terhadap nilai perusahaan.

Kata Kunci: *Carbon Emission Disclosure; Corporate Social Responsibility Disclosure; Eco-Efficiency; Nilai Perusahaan*

Artikel dapat diakses : <https://ejournal1.unud.ac.id/index.php/akuntansi/index>



e-ISSN 2302-8556

Vol. 35 No. 11  
Denpasar, November 2025  
Hal. 2130-2146

DOI:  
10.24843/EJA.2025.v35.i11.p11

## PENGUTIPAN:

Fitri, A. N., & Putra, V. D. C.,  
(2025). The Effect of Carbon  
Emission Disclosure,  
Corporate Social  
Responsibility Disclosure, and  
Eco-efficiency on Firm Value.  
E-Jurnal Akuntansi, 35(12),  
2130-2146

## RIWAYAT ARTIKEL:

Artikel Masuk:  
16 Mei 2025  
Artikel Diterima:  
01 November 2025

## INTRODUCTION

An environmental crisis occurs when companies strive to maximize profits without considering the ecological impact (Khan et al., 2020). Environmental issues, including air pollution, increased carbon emissions, global climate change, water pollution, and excessive exploitation of natural resources, have received significant attention both nationally and internationally (P. P. Dewi & Narayana, 2020). Accordingly, the evaluation of investment choices must extend beyond purely economic gains to include the wider social and environmental impacts that those investments may produce. The business paradigm is now shifting from a sole focus on profit to a triple bottom line approach, which integrates a balance between profit, society, and the planet (Kurnia et al., 2020). The way investors evaluate a firm significantly shapes its overall valuation. Since a firm's value is ultimately manifested through its stock price, investor perceptions become a key determinant in this process, investors' assessment of a firm's reputation can also directly impact its stock price.

Companies can enhance their public image by showing authentic commitment and active participation in tackling social and environmental challenges (Somjai et al., 2020); (Machmuddah et al., 2020). These efforts not only lessen the firm's dependence on purely financial outcomes but also promote the adoption of sustainable business operations (S. La Nguyen et al., 2020). An upward movement in a firm's share price reflects improved market confidence in its overall performance. When a firm's value strengthens, its capacity to draw investor interest and obtain additional investment capital correspondingly increases (Oktaviani & Al Khozi, 2025). Consequently, firms need to provide disclosures related to environmental matters to cultivate a positive image among stakeholders. Such actions ultimately reinforce corporate reputation and motivate investors to allocate their capital.

One important aspect of environmental information is carbon emission management. Based on EDGAR data (European Commission, 2023), Indonesia's greenhouse gas (GHG) emissions have shown a significant upward trend from 1990 to 2022. In 1990, total emissions were recorded at 427.65 Mt CO<sub>2</sub>eq and continued to increase, reaching 1,240.83 Mt CO<sub>2</sub>eq in 2022. This increase mainly came from the industrial, energy, agricultural, and waste sectors. Per capita emissions also increased from 2.36 t CO<sub>2</sub>eq in 1990 to 4.47 t CO<sub>2</sub>eq in 2022. The composition of emissions in 2022 was dominated by CO<sub>2</sub> at 55.8%, followed by CH<sub>4</sub> at 36.5%, N<sub>2</sub>O at 6.4%, and F-gases at 1.3%.

One form of corporate environmental responsibility is manifested through corporate social responsibility (CSR) disclosure. This form of disclosure involves the transparent disclosure of information regarding various firm initiatives aimed at reducing greenhouse gas emissions. Such disclosure increases organizational accountability by informing stakeholders about efforts made to reduce environmental impact. In Indonesia, CO<sub>2</sub> emissions disclosure is still voluntary. However, the government has taken strategic steps to strengthen social responsibility by passing Law No. 17 of 2004, which formalized Indonesia's ratification of the Kyoto Protocol, serves as an essential legal foundation for its efforts to control greenhouse gas emissions (Rahmanita, 2020); (Kustinah et al., 2025). These regulatory measures encourage companies to integrate carbon

management strategies into their business operations. This, in turn, increases companies' interest in disclosing carbon information, as it is an important mechanism for regulatory compliance and environmental risk management (Liu et al., 2025). To reduce carbon emissions, companies can manage and monitor their operations by implementing carbon accounting. Carbon accounting represents a specialized branch of environmental accounting that focuses on generating information regarding the quantification of carbon emissions from industrial operations, the establishment of emission-reduction goals, the procedures for disclosure, and the formulation of initiatives aimed at lowering emissions. This activity is widely referred to as “carbon emissions disclosure” (Kurnia et al., 2020).

Carbon emissions disclosure is a crucial element in a firm's environmental strategy, as it demonstrates the firm's commitment to climate change. The implementation of proactive environmental policies generally improves operational efficiency and reduces various risks that affect human health and the environment (Khatib et al., 2023). In addition, transparent carbon emissions disclosure increases a firm's attractiveness to investors. Even in situations where companies engage in potentially environmentally damaging activities to maximize profits, openness in carbon emissions disclosure can positively influence investor perceptions and ultimately impact firm value, its performance can still be maintained if the firm is able to reduce the level of pollution it produces (Kurnia et al., 2020). Ensuring transparency and clear communication of financial information plays an important role in strengthening good governance practices. This concept likewise applies to corporations, where the disclosure of corporate social responsibility activities can foster public confidence and ultimately enhance a firm's value (Putra & Romli, 2020). The implementation of concrete environmental initiatives, accompanied by transparent disclosure of information related to these initiatives, can positively influence firm value (Kurnia et al., 2020). Based on research (Rahmanita, 2020) and (Sari & Budiasih, 2022) concluded that carbon emissions disclosure has the potential to affect firm value. Investors tend to respond positively to voluntary carbon emissions reports, as this information is considered an important factor in assessing the extent to which companies implement sustainability practices.

Firm value is also determined by eco-efficiency. Eco-efficiency refers to an approach that aims to achieve production efficiency that generates high output but low costs through the implementation of environmentally friendly practices. In other words, companies strive to optimize economic results without sacrificing environmental sustainability. According to (Damas et al., 2021), many investors are now choosing companies that care about the environment. However, it is still debatable whether improved environmental performance can actually reduce shareholder value. Efforts by companies to address climate change often entail additional costs related to complying with environmental standards. These increased production costs can weaken a firm's competitive position in the market. Consequently, such financial pressures may negatively affect shareholder wealth (Damas et al., 2021).

This study highlights the decline in firm value in the basic materials sector, a phenomenon that occurred in the form of a decline in share value, namely PT Gunung Raja Paksi Tbk, which experienced a decline in its share price in 2024 from

IDR 268 per share compared with the previous year's IDR 466 per share. PT Indocement Tunggul Prakarsa Tbk showed a decline in its share price in 2024 from IDR 7,400 per share compared with the previous year's IDR 9,400 per share. At PT Semen Indonesia (Persero) Tbk (SMGR), the share price continued to decline from IDR 7,250 per share in 2021 to IDR 3,290 per share in 2024, in line with the JCI correction of 2.65% at the level of 7,079.90 in 2024. SMGR's financial performance also showed a decline, with 2021 revenue of IDR 34.95 trillion (down 0.62%), gross profit down 7.36% to IDR 10.95 trillion, and net profit down 27.33% to IDR 2.02 trillion. In addition, the firm's total assets decreased to IDR 76.5 trillion, reflecting the weakening value of companies in the basic materials sector (T.Rahmawati, 2022).

Therefore, this study adopts the framework (Damas et al., 2021) by reviewing the consistency of their results across companies operating in the basic materials sector. Several aspects distinguish this research from prior studies, including the 2021–2024 observation horizon, the adoption of a more carefully selected sample, and the incorporation of an additional variable corporate social responsibility disclosure. The study's novelty arises from integrating three central sustainability dimensions: carbon emission disclosure, corporate social responsibility disclosure, and environmental efficiency, into a single analytical model to explain firm value. Rather than analyzing each variable in isolation, this research employs a comprehensive analytical framework that evaluates how firm value is influenced by the combined contributions of carbon emission disclosure, CSR disclosure, and environmental efficiency.

Legitimacy theory is a general framework that explains how companies endeavor to obtain and sustain social approval by disclosing their social and environmental activities (Kurnia et al., 2020); (Deegan & Gordon, 1996). Within this theoretical framework, companies are regarded as entities that have a social contract with society, whereby the sustainability of their activities is highly dependent on public acceptance (Kurnia et al., 2020); (Deegan et al., 2002); (Patten, 1991). Legitimacy theory posits that companies gain legitimacy when their values align with prevailing social norms and values. Conversely, if there is disharmony real or potential between corporate values and social values, this situation can threaten the sustainability of business activities and public acceptance (Sari & Budiasih, 2022). Sustainability reports serve as a strategic communication medium for companies to strengthen their social legitimacy and demonstrate their commitment to environmental sustainability. Through these reports, companies seek to demonstrate their social responsibility and create benefits for all stakeholders, not limited to shareholders (Rais & Usman, 2020).

Stakeholder theory, introduced by Freeman in 1984 in his work "Strategic Management: The concept presented in *A Stakeholder Approach* emphasizes that corporate social responsibility encompasses obligations not only to shareholders but also to all individuals or groups who possess an interest in, or are influenced by, the firm's operations. Stakeholders therefore consist of various groups, including employees, suppliers, government entities, the community, and the natural environment. This theory contends that a firm's success is shaped by its

capacity to balance these diverse interests and meet the expectations of all stakeholders, not just shareholders (S. La Nguyen et al., 2020).

Carbon emissions disclosure functions as evidence of a firm's commitment to fulfilling its environmental responsibilities. Through transparency in disclosure environmental information, companies provide investors with clarity about their CO<sub>2</sub> performance. Such disclosure serves as an essential mechanism for sustaining stakeholder confidence and reinforcing the organization's legitimacy (Hardiyansah et al., 2021). Several studies, such as those conducted by (Rahmanita, 2020); (Rusmana & Purnaman, 2020); (Lee & Cho, 2021); (Alfayerds & Setiawan, 2021); (Kurnia et al., 2021) and (Huang et al., 2025), empirical evidence further demonstrates that transparent disclosure of carbon emissions positively contributes to enhancing a firm's overall value. Enhancing corporate value is closely associated with transparent communication of carbon-related information, particularly as investor attention toward global environmental challenges continues to rise. As awareness of climate change intensifies, companies that exhibit strong commitment and clear accountability in environmental stewardship tend to attract greater investor interest (Kurnia et al., 2020).

H<sub>1</sub>: Carbon emissions disclosure has a positive impact on firm value.

From the perspective of stakeholder theory, CSR disclosure signifies a firm's obligation to act transparently and accountability. It reflects the firm's awareness that its operations must address stakeholder interests and expectations. Such disclosure also serves as a mechanism for communicating ethical and accountable behavior. Ultimately, it strengthens the firm's relationship with the parties affected by its activities. This practice encourages companies to strengthen their internal governance systems in order to be more effective in meeting and protecting the interests of stakeholders (V. H. Nguyen, 2025). This practice plays a vital role in enhancing future cash flow projections by promoting greater production efficiency and strengthening financial performance (Tsang et al., 2024). By optimizing corporate social responsibility disclosure, companies can elicit a positive market response. This is reflected in rising stock prices, which subsequently influences overall firm value. Numerous studies (Machmuddah et al., 2020); (Tsang et al., 2024) and (V. H. Nguyen, 2025) empirical evidence indicates that the disclosure of corporate social responsibility contributes positively to the enhancement of a firm's value.

H<sub>2</sub>: Corporate social responsibility disclosure has a positive impact on firm value.

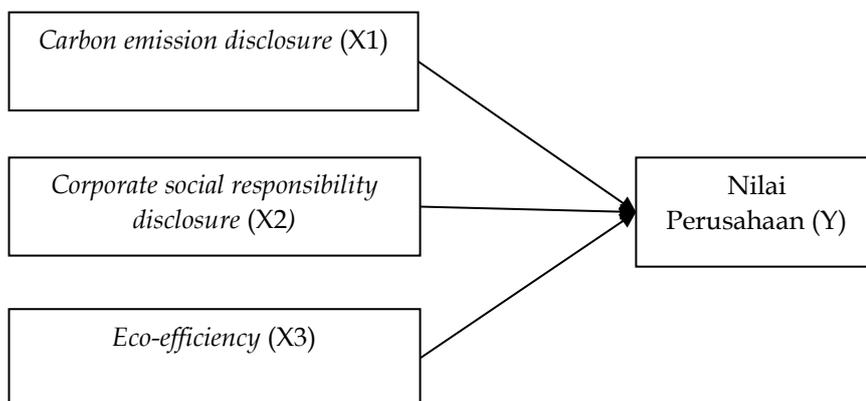
Eco-efficiency is used as a way to manage a firm's production, focusing on controlling environmental pollution and improving business performance. Ultimately, the undertaken measures exert an incremental influence on the firm's market-based valuation, reflecting stakeholders' strengthened confidence in the firm's strategic and ethical positioning (Atiningsih & Andre Setiyono, 2023). Within the framework of legitimacy theory, firms are expected to ensure that their business practices correspond to prevailing societal norms and expectations. One effective way to achieve this is by implementing the concept of eco-efficiency as a key part of an environmental management strategy. The adoption of eco-efficiency not only serves as a managerial tool to mitigate environmental impacts but also adds value for shareholders (Damas et al., 2021). Empirical evidence presented by (Damas et al., 2021) and (Syahrizam et al., 2025) that the adoption of eco-efficiency

measures generates measurable improvements in a firm's economic performance, and this association is supported by statistically significant results demonstrating a positive effect on firm value.

H<sub>3</sub>: Eco-efficiency has a positive impact on firm value.

By carbon emissions disclosure, a firm conveys its proactive stance toward global environmental concerns, a factor that increasingly shapes investor preferences. Likewise, transparency in CSR activities contributes to strengthening the firm's societal standing and fostering positive stakeholder evaluations. Furthermore, implementing ecological efficiency can improve operational efficiency and reduce costs through more effective resource utilization, thus positively impacting a firm's financial performance. These assertions are supported by studies conducted by (Andari & Yuliandhari, 2020); (Atiningsih & Andre Setiyono, 2023); (Sunarto et al., 2024) and (Pelawi & Inawati, 2024).

H<sub>4</sub>: Carbon emission disclosure, corporate social responsibility disclosure, and eco-efficiency simultaneously affect firm value.



**Figure 1. Conceptual Framework**

Source: Research Data, 2025

## METODE PENELITIAN

The research method used in this study is quantitative, utilizing secondary data taken from annual reports and sustainability reports, as well as historical information recorded on the Indonesia Stock Exchange (IDX) for the period 2021 to 2024. The study population consists of manufacturing companies in the basic materials subsector during the same period. The sample was selected through purposive sampling, resulting in 19 companies with a total of 76 observations. The sample selection criteria include: (1) manufacturing companies in the basic materials subsector listed on the IDX between 2021 and 2024; (2) companies that have conducted an initial public offering (IPO) on the IDX before the 2021-2024 period; (3) companies that consistently publish annual reports with the GRI index from 2021 to 2024; (4) companies that included energy consumption data in their annual reports throughout the period; and (5) companies that carbon emission disclosure for four consecutive years based on annual and sustainability reports, with at least one carbon emission disclosure item.

This study employs the Tobin's Q ratio as an indicator for assessing firm value. According to (P. P. Dewi & Narayana, 2020), this ratio is important because

it provides insight into how financial markets currently assess the potential return on an investment.

$$Tobin's Q = \frac{MVS + Total Liabilities}{Total Asset} \dots\dots\dots(1)$$

Source: (Dewi & Narayana, 2020)

This study uses disclosures on carbon emissions based on Global Disclosure Initiative (GRI) 302 and 305, as follows:

Energy disclosure (referring to GRI 302)

1. Disclosure 305-1 Direct (Scope 1) greenhouse gas emissions
2. Disclosure 305-2 Indirect (Scope 2) greenhouse gas emissions
3. Disclosure 305-3 Other indirect (Scope 3) greenhouse gas emissions
4. Disclosure 305-4 Greenhouse gas emissions intensity
5. Disclosure 305-5 Greenhouse gas emissions reduction
6. Disclosure 305-6 Concerns the disclosure of Ozone-depleting substance (ODS) emissions.
7. Disclosure 305-7 concerns the disclosure of nitrogen oxides (NOX), sulfur oxides (SOX), and other major air emissions.

In corporate social responsibility disclosures, calculations are performed using a dummy scale. This scale is used to assign a score to each item that a firm discloses in its sustainability report. A value of 1 is assigned when an item is reported, whereas a value of 0 is given when it is omitted. The overall score is subsequently calculated based on a specified formula.

$$CSR_{ij} = \frac{\sum X_{ij}}{N_j} \dots\dots\dots(2)$$

Source: (Kristanti, 2020)

Description:

CSR<sub>ij</sub>: Corporate Social Responsibility Index

X<sub>ij</sub>: Dummy variable; 1 = disclosed, 0 = not disclosed.

Number of corporate social responsibility disclosures by companies

In this study, ecological efficiency was measured based on WBCSD (2006) standards, namely by comparing product value (net income) with the resulting environmental impact, including the use of raw materials, electricity, water, gas, and fuel. The formula for calculating eco-efficiency is as follows:

$$Eco-efficiency = \frac{Net Sales}{Pengaruh Lingkungan} \times 100\% \dots\dots\dots(3)$$

Source: ((WBCSD), 2006)

This study examines several classical assumption requirements, including tests for normality, multicollinearity, heteroscedasticity, and autocorrelation. The hypotheses were evaluated using both simultaneous and individual (partial) testing procedures. The analytical approach employed in the research consists of descriptive statistical techniques and multiple linear regression analysis. The regression framework applied in this study is represented in the following equation.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon \dots\dots\dots(4)$$

Description:

Y = Firm Value

$\alpha$  = Constant

X1 = Carbon emission disclosure

X2 = Corporate social responsibility disclosure

X3 = Eco-efficiency

$\beta_1 \beta_2 \beta_3$  = Multiple regression coefficients between each variable

$\varepsilon$  = Standard error

## RESULTS AND DISCUSSION

The characteristics of the variables in this study were described using descriptive statistical analysis. This method provides a summary overview that highlights important features of the data. This analysis included measuring the sample size, highest and lowest values, mean values, and standard deviations. The results obtained from this analysis are systematically presented in Table 1.

**Table 1. Descriptive Statistical Test Results**

	N	Minimum	Maximum	Mean	Std. Deviation
CED	76	0,17	1,00	0,6689	0,29470
CSRD	76	0,28	1,00	0,6504	0,21182
<i>Eco-efficiency</i>	76	0,90	5,41	1,9994	0,82066
Nilai Perusahaan	76	0,36	7,58	1,2167	1,03309
Valid N (listwise)	76				

Source: Research Data, 2025

According to the information provided in Table 1, the analysis of descriptive statistics indicates that the 'Carbon Emissions Disclosure' variable spans from a low of 0,17 to a high of 1,00, with an average of 0,6689. In terms of 'Corporate Social Responsibility,' the figures vary from 0,28 to 1,00, producing an average of 0,6504. The 'Eco-efficiency' variable reflects a lowest value of 0,90 and a highest value of 5,41, with a mean of 1,9994. Furthermore, the 'Firm Value' variable has a minimum of 0,36, a maximum of 7,58, and an average of 1,2167.

The assessment of data normality in this research was performed using the Kolmogorov-Smirnov (KS) procedure, implemented through the Statistical Package for the Social Sciences (SPSS) for Windows. The results generated from this normality analysis are presented in Table 2.

**Table 2. Normality Test Results**

		Unstandardized Residual
N		59
Normal Parameters <sup>a,b</sup>	Mean	0,0000000
	Std. Deviation	0,22255841
Most Extreme Differences	Absolute	0,078
	Positive	0,078
	Negative	-0,047
Test Statistic		0,078
Asymp. Sig. (2-tailed) <sup>c</sup>		.200 <sup>d</sup>

Source: Research Data, 2025

Referring to the results presented in Table 2, the normality test conducted using the Kolmogorov-Smirnov method produced an Asymp. Sig. (two-tailed) value of 0,200. Since this value exceeds the significance threshold of  $\alpha = 0,05$ , the residuals in this study can be concluded to be normally distributed.

**Table 3. Multicollinearity Test Results**

Variabel	Tolerance	VIF
CED	0,417	2,400
CSR	0,419	2,389
<i>Eco-efficiency</i>	0,988	1,013

Source: Research Data, 2025

According to the information provided in Table 3, the tolerance values and variance inflation factor (VIF) indicators show that all tolerance values exceed 0.1 and none of the VIF values surpass 10. Since values below these thresholds typically indicate serious multicollinearity, the results confirm that the variables included in this study are free from multicollinearity issues.

**Table 4. Heteroscedasticity Test Results**

Variabel	Sig.
CED	0,771
CSR	0,500
<i>Eco-efficiency</i>	0,968

Source: Research Data, 2025

According to the information provided in Table 4, the significance levels for the variables are indicated as follows: carbon emission disclosure (X1) is at 0,771, corporate social responsibility disclosure (X2) is at 0,500, and eco-efficiency (X3) is at 0,968. Since all the reported values exceed the 0,05 threshold, it can be concluded that the regression model shows no signs of heteroscedasticity. This indicates that the residuals exhibit consistent variance across the dataset, fulfilling an important assumption for reliable regression analysis.

**Table 5. Autocorrelation Test Results**

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.380 <sup>a</sup>	0,144	0,098	0,22855	1,801

Source: Research Data, 2025

According to the information provided in Table 5, the Durbin Watson (DW) figure for the multiple linear regression model is 1,801. The important values are  $d_l = 1,475$  and  $d_u = 1,688$ . Because the DW figure is located between the limits of 1,688.

**Table 6. Multiple Linear Regression Analysis Results**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0,561	0,092		6,071	0,000
CED	0,151	0,200	0,145	0,751	0,456
CSRD	-0,424	0,263	-0,310	-1,610	0,113
<i>Eco-efficiency</i>	0,116	0,046	0,320	2,551	0,014

Source: Research Data, 2025

According to the information provided in Table 6, we can create the following regression equation.

$$Y = 0,561 + 0,151X_1 - 0,424X_2 + 0,116X_3 + \epsilon$$

The results of the F-test indicate that the model is statistically acceptable, as the obtained F-statistic of 3,092 corresponds to a significance value of 0,034, which is below the threshold of  $\alpha = 0,05$ . This confirms that the regression model utilized in the study is suitable for further analysis. In addition, the coefficient of determination shows an adjusted  $R^2$  of 0,144, implying that carbon emission disclosure, corporate social responsibility disclosure, and eco-efficiency together account for 14,4 percent of the variation in firm value. The remaining 85,6 percent is influenced by factors not included within the scope of the model.

The T-test produced a positive coefficient for carbon emission disclosure with a significance level of 0,456. Because this value is not statistically significant, ( $H_0$ ) is accepted and ( $H_a$ ) is rejected, meaning that carbon emission disclosure does not affect firm value. This result supports (Sitorus, 2024), who found a similar lack of impact. These findings further strengthen this understanding the legitimacy theory, which suggests that such disclosures are mainly done to meet regulatory obligations rather than to increase firm value. The regression analysis further shows that the carbon emission disclosure variable possesses a coefficient of 0,151, a t-statistic of 0,751, and a standard error of 0,200. Although the positive coefficient reflects an upward tendency in the dependent variable as disclosure increases, this association is not statistically significant. However, this effect is relatively weak because the coefficient and t-values are relatively small.

Furthermore, the large standard error relative to the coefficient indicates significant data variation between companies, resulting in uneven levels of carbon emissions disclosure. This finding indicates that carbon disclosure by companies is still suboptimal and does not yet constitute a significant factor influencing the model results. This is likely because disclosure practices are still administrative in nature, without any real efforts to control CO2 emissions (Lesmana & Tatariyanto, 2025). However, the findings of this study diverge from those reported by (Kurnia et al., 2021) and (Putri & Rahmah, 2025), these researchers concluded that carbon emission disclosure exerts a significant positive influence on firm value.

The T-test conducted on the corporate social responsibility (CSR) disclosure variable produced a negative coefficient with a significance value of 0.113. As a result, the null hypothesis (H<sub>0</sub>) is supported, and the alternative hypothesis (H<sub>a</sub>) is not accepted. These results indicate that CSR disclosure does not exert a statistically meaningful effect on firm value. In addition, this outcome aligns with earlier research by (Krismawati & Windiarti, 2025); (Asih & Winarso, 2024); and (Andari & Yuliandhari, 2020), which also demonstrated that CSR disclosure fails to exert a significant influence on firm value. The analysis table indicates that the CSR disclosure variable yields a coefficient of -0.424, a t-value of -1.610, and a standard error of 0.263. The negative coefficient suggests a pattern in which higher levels of CSR disclosure correlate with a reduction in the dependent variable, specifically firm value. This surprising result could be attributed to CSR activities not being supported by observable performance or tangible outcomes that elevate firm valuation. Additionally, the relatively low t-value and the sizable standard error imply inconsistencies among firms in disclosure social initiatives, thereby diminishing the contribution of CSR disclosure to the regression model.

Furthermore, Corporate social responsibility (CSR) initiatives are generally viewed as strategic investments undertaken with a long-term perspective. Organizations often implement CSR activities not merely for immediate gains, but to achieve sustained improvements in reputation, stakeholder trust, and overall corporate sustainability over time, its positive effects on corporate performance and valuation are likely to manifest over a prolonged period. In the short term, it is reasonable for CSR activities to have an insignificant impact on firm value. Moreover, CSR disclosure frequently acts more as a communication tool to investors and a means to cultivate a favorable corporate reputation, rather than an immediate enhancer of stock prices or firm valuation (Sumarlan & Fauziah, 2024). However, the findings of this study diverge from those reported by (Machmuddah et al., 2020), who found that CSR disclosure positively and significantly increases firm value.

The T-test analysis conducted on the eco-efficiency metric yielded a positive outcome, with a statistical significance of 0,014. Consequently, the null hypothesis (H<sub>0</sub>) is refuted, and the alternative hypothesis (H<sub>a</sub>) is substantiated, suggesting that eco-efficiency exerts a discernible positive impact on corporate valuation. This outcome is congruent with the research presented by (Syahrizam et al., 2025), which similarly ascertained a beneficial relationship between eco-efficiency and firm value. Examination of the empirical data indicates that eco-efficiency exerts the most substantial effect among the independent variables, characterized by a coefficient of 0,116, a t-value of 2,551, and a standard error of 0.046. The comparatively low standard error in relation to the coefficient implies a degree of uniformity in the disclosure of eco-efficiency by various enterprises. In summation, these observations underscore a consistent and affirmative association between eco-efficiency and the value of a firm. This shows that improving environmental efficiency in resource use and waste management contributes directly to increasing firm value. Companies that are able to manage resources effectively and reduce environmental impact tend to create added value. In addition, companies can enhance the production of goods and services by utilizing

energy and natural resources more efficiently, which results in reduced waste and pollution.

The implementation of eco-efficiency strategies demonstrates that a firm is committed not solely to profit maximization but also to preserving environmental quality across its operational activities (Syahrizam et al., 2025). Such efforts are aligned with the principles of legitimacy theory, which contends that organizations securing congruence between their actions and societal expectations are more likely to obtain public trust and approval factors that contribute to enhanced firm value (Atiningsih & Andre Setiyono, 2023). Furthermore, the conclusions derived from this study are substantiated by a substantial array of earlier empirical works, among them the studies of (Rais & Usman, 2020); (R. Dewi & Rahmianingsih, 2020); (Daud et al., 2023); (Pelawi & Inawati, 2024); (Wasyiah et al., 2025) and (Syahrizam et al., 2025). Collectively, these studies show that eco-efficiency positively and significantly increases firm value, thereby strengthening the findings of this research.

## CONCLUSION

The results of the analysis and discussion suggest that firm value is not significantly affected by either carbon emission disclosure or corporate social responsibility disclosure. In contrast, eco-efficiency exhibits a strong and positive contribution to firm value. Taken together, the evidence shows that carbon emission transparency, CSR disclosure, and eco-efficiency exert a combined influence on a firm's overall value.

The research was structured to investigate the extent to which carbon emission disclosure, CSR disclosure, and eco-efficiency influence firm value, and this aim has been effectively achieved. The results show that only eco-efficiency positively and significantly affects firm value. However, the study is limited by using only Tobin's Q as the firm value metric and by excluding other potentially relevant independent variables. Future research is recommended to use the latest Carbon Disclosure Project indicators with broader coverage and to examine other sectors with different levels of environmental sensitivity to obtain more varied and comprehensive results.

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