

The Effect of Carbon Emission Disclosure, Green Innovation, and Green Strategy on Firm Value (Empirical Study on Manufacturing Companies Listed on the Indonesian Sharia Stock Index (ISSI), 2021–2024)

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Abstract

Firm value is an important indicator that reflects investors' perceptions of a company's success in managing resources and achieving its objectives. In the modern business era, companies are not only required to improve financial performance but also to pay attention to environmental sustainability. Carbon Emission Disclosure, Green Innovation, and Green Strategy are considered factors that can enhance firm value through environmental transparency, environmentally friendly innovation, and the implementation of sustainable business strategies. However, prior studies on these variables and firm value have produced inconsistent results. This study aims to analyze the effect of Carbon Emission Disclosure, Green Innovation, and Green Strategy on the firm value of manufacturing companies listed on the Indonesian Sharia Stock Index (ISSI) during the 2021–2024 period. This study employs a quantitative approach with a causal associative research design. The data used are secondary data obtained from annual reports and sustainability reports of manufacturing companies listed on ISSI for the period 2021–2024. Purposive sampling yielded 40 research samples. Data analysis used multiple linear regression with IBM SPSS Statistics version 26. The results indicate that Carbon Emission Disclosure has a positive coefficient but does not significantly affect firm value, while Green Innovation and Green Strategy have negative coefficients and significantly affect firm value. Simultaneously, all three variables significantly affect firm value. These findings suggest that investors evaluate a company's overall commitment to environmental sustainability rather than considering individual sustainability aspects in isolation.

Keywords: *Carbon Emission Disclosure; Green Innovation; Green Strategy; Firm Value*

1. Introduction

Firm value has become a primary concern for companies in an increasingly competitive business environment. It serves as a benchmark for corporate sustainability, and maintaining high

firm value is synonymous with preserving and enhancing shareholder prosperity. Firm value reflects the amount investors are willing to pay, making its sustained improvement a key corporate objective (Zuhrufiyah & Anggraeni, 2019).

Firm value is no longer determined solely by financial performance, but also by a company's ability to manage its environmental and social responsibilities. This aligns with the contemporary accounting concept of the Triple Bottom Line (3P) proposed by Elkington, which directs companies to operate not only in pursuit of profit, but also to take responsibility for the planet and people. Companies that are more attentive to environmental conditions tend to be more attractive to investors, thereby influencing firm value (Hardiyansah et al., 2021).

Indonesia, recorded as one of the largest greenhouse gas emitters in the world, has demonstrated commitment through several regulatory frameworks, including Law No. 17 of 2004 on the Ratification of the Kyoto Protocol, Law No. 16 of 2016 on the Ratification of the Paris Agreement (targeting a 29% reduction in greenhouse gas emissions by 2030), Presidential Regulation No. 61 of 2011 on the National Action Plan for Greenhouse Gas Emission Reductions, and Presidential Regulation No. 71 of 2011 on the National Greenhouse Gas Inventory.

Despite these regulatory frameworks, violations continue to occur. Greenpeace International has cited Indonesia as a major contributor to greenhouse gas emissions through forest and peatland fires during 2015–2018. Musim Mas was reported to have generated approximately 39 million tonnes of CO₂ from peatland burning, while Wilmar produced around 43 million tonnes and Unilever around 51 million tonnes. Several Indonesian companies, including PT Bumi Mekar Hijau (a subsidiary of Sinarmas Group), have faced civil lawsuits and criminal charges for burning forests and peatlands, resulting in substantial financial penalties (Arumingtyas & Saturi, 2019; Rahma, 2019).

Indonesia's CO₂ emissions per capita increased by 1,133.66% over the past century, from 1920 to 2020, driven by rising consumption of fossil fuels, gas, and coal. Growing industrial activity is directly correlated with increasing pollution, contributing to the accumulation of greenhouse gases and accelerating climate change (Ritchie et al., 2021).

In response to growing environmental pressures, the Financial Services Authority (OJK) has gradually moved toward mandating the publication of sustainability reports for listed issuers through POJK No. 51 of 2017. The obligation is being phased in progressively, with medium-sized issuers required to publish sustainability reports from 2023 and smaller issuers from 2025. Carbon emission disclosure, as part of the sustainability report, is increasingly important for stakeholders, particularly investors who are drawn to companies demonstrating environmental commitment (Ramadhani, 2026).

The Qur'an explicitly acknowledges the consequences of human-caused environmental degradation, as stated in Surah Ar-Rum verses 41–42: "Corruption has appeared throughout the land and sea by reason of what the hands of people have earned so He may let them taste part of [the consequence of] what they have done that perhaps they will return [to righteousness]. Say: Travel through the land and observe how was the end of those before. Most of them were associators [of others with Allah]." Islam thus teaches that humans bear the responsibility of stewardship (khilafah) over the earth and are accountable for the preservation of its ecosystems.

Beyond carbon disclosure, companies can demonstrate environmental commitment through Green Innovation—the development of environmentally friendly products, processes, and technologies that reduce environmental impact while enhancing competitiveness. Green Innovation is recognised as a tool for long-term corporate sustainability, capable of increasing productivity, market competitiveness, and ultimately firm value (Dewi & Rahmianingsih, 2020). Similarly, Green Strategy refers to the integration of environmental sustainability into long-term business planning, encompassing energy efficiency, waste management, environmentally friendly raw materials, and cleaner technologies.

This study integrates three strategic sustainability variables—Carbon Emission Disclosure, Green Innovation, and Green Strategy—simultaneously to explain their effect on firm value, addressing a gap in prior literature which largely examined these variables in isolation. The study focuses on Islamic Sharia-compliant companies listed on the Indonesian Sharia Stock Index (ISSI), contributing new insights into how environmental sustainability practices apply within an Islamic business framework that emphasises ethical values and social responsibility.

2. Literature Review

Legitimacy Theory

Legitimacy theory posits that companies disclose social responsibility information to obtain or maintain legitimacy from society. When a legitimacy gap arises, information disclosure is used to realign the company's activities with societal values and norms (Permatasari et al., 2019). This theory rests on the concept of a "social contract" between an organisation and the society in which it operates. Public expectations have shifted significantly in recent decades, with society expecting successful companies to consider the human, environmental, and social consequences of their activities. Legitimacy theory emphasises that companies must be attentive to broad public rights, not only investor interests (Susanti et al., 2022).

Stakeholder Theory

Based on Freeman's (1994) stakeholder theory, managing stakeholder relationships is a sound business practice as it enables companies and their managers to achieve mutually understood objectives. Stakeholder theory reveals that a company must benefit all its stakeholders, not only its own interests. Stakeholders include individuals, groups, communities, or societies that have interests and relationships with the company (Saputri & Fidiana, 2023). Based on this theory, companies must respond to stakeholders' information needs through transparency, including through the disclosure of carbon emission information.

Signalling Theory

Signalling theory addresses the motivation for companies to disclose information to external parties, as such disclosures can influence investment decisions by outsiders (Spence, 2002). Information disclosed by companies in their annual reports serves as a signal for investors in making investment decisions. Companies that report environmental and social information are expected to enhance their financial performance and firm value. Signals can take the form of good news or bad news, both of which ultimately influence firm value (Muki, 2025).

Carbon Emission Disclosure

Carbon Emission Disclosure (CED) is a form of environmental disclosure constituting a supplementary report as outlined in PSAK. It encompasses quantitative and qualitative information related to past and projected carbon emission levels, the financial implications of climate-related risks and opportunities, and past and future actions to manage such risks. CED reflects good corporate governance and strong carbon performance, and is recognised as a means to enhance firm value through environmental transparency (Wirawan & Setijaningsih, 2022).

Green Innovation

Green Innovation (GI) refers to the development or modification of new ideas in business to achieve sustainability in environmental, economic, and social dimensions. It encompasses innovations in technology, products, and processes that reduce environmental impact while creating competitive advantages. Companies that implement Green Innovation are regarded as environmentally responsible and capable of utilising resources efficiently, thereby increasing investor confidence and firm value (Pratiwi & Rodiah, 2024).

Green Strategy

Green Strategy (GS) is a business strategy oriented toward sustainability by balancing economic, social, and environmental objectives. It emphasises efficient resource management, the

use of environmentally friendly technologies, and innovation in production processes that minimise negative environmental impacts. Companies disclosing carbon emission information as part of their Green Strategy are considered capable of managing carbon emissions to minimise risks and opportunities arising from climate change (Ramadhani & Astuti, 2023).

Firm Value

Firm value is a specific condition achieved by a company that serves as investors' reference before committing capital. It is closely associated with the company's stock market price, with high firm value indicating shareholder prosperity. Companies that are well-managed can improve returns and reduce future risk of loss. In this study, firm value is measured using the Price-to-Book Value (PBV) ratio (Fauziyah, 2017).

Hypotheses

Based on the theoretical frameworks and prior empirical evidence, the research hypotheses are as follows:

- H1: Carbon Emission Disclosure has a significant positive effect on Firm Value.
- H2: Green Innovation has a significant positive effect on Firm Value.
- H3: Green Strategy has a significant positive effect on Firm Value.
- H4: Carbon Emission Disclosure, Green Innovation, and Green Strategy simultaneously have a significant positive effect on Firm Value.

3. Research Methods

This study employs a quantitative approach with a causal associative research design, aimed at determining the relationship of influence between two or more variables. Secondary data were obtained from the annual reports and sustainability reports of manufacturing companies listed on the Indonesian Sharia Stock Index (ISSI) for the period 2021–2024. The research commenced in September 2025. ISSI was selected because its constituent companies are publicly listed and issue sharia-compliant shares.

Population, Sample, and Sampling Technique

The population comprises all manufacturing companies consistently listed as ISSI constituents during 2021–2024, spanning three main categories: basic industry and chemicals, miscellaneous industry, and consumer goods industry, totalling 36 companies. Purposive sampling was applied based on the following criteria: (1) companies operating in the manufacturing sector as classified by the Indonesia Stock Exchange; (2) companies consistently listed on ISSI throughout 2021–2024; (3) companies publishing annual reports or sustainability reports containing complete Carbon Emission Disclosure, Green Innovation, and Green Strategy indicators for 2021–2024; (4) companies with sufficient financial data to compute firm value (PBV) throughout the observation period; and (5) companies that did not undergo delisting or sector migration during the observation period. The final sample consists of 10 companies observed over 4 years, yielding 40 data observations.

Variable Measurement

The dependent variable is Firm Value, measured using the Price-to-Book Value (PBV) ratio. The independent variables are: (1) Carbon Emission Disclosure (CED), measured using an index derived from items disclosed in the annual or sustainability report; (2) Green Innovation (GI), measured using a disclosure index of green innovation activities reported in the annual or sustainability report; and (3) Green Strategy (GS), measured using a disclosure index of environmental policies and strategies included in the annual or sustainability report. Data were analysed using IBM SPSS Statistics version 26, incorporating descriptive statistics, classical assumption tests, multiple linear regression, partial tests (t-test), simultaneous tests (F-test), and coefficient of determination (R^2).

4. Results and Discussion

Descriptive Statistics

Table 1. Descriptive Statistics Results

Variable	N	Minimum	Maximum	Sum	Mean	Std. Deviation
CED	36	0.03	0.14	4.01	0.1113	0.03034
GI	36	0.25	1.00	28.25	0.7847	0.14824
GS	36	0.11	1.00	23.14	0.6427	0.30029
PBV	36	0.15	6.37	70.18	1.9495	1.59690

Source: Processed data, 2026

Based on the descriptive statistics, 36 observations were used. Firm Value (PBV) has a minimum of 0.15 and maximum of 6.37, with a mean of 1.9495 and standard deviation of 1.59690, indicating a generally adequate level of firm value among the sample companies. Carbon Emission Disclosure (CED) has a mean of 0.1113 and standard deviation of 0.03034, suggesting relatively homogeneous disclosure levels. Green Innovation (GI) has a mean of 0.7847 and standard deviation of 0.14824, reflecting consistent adoption of green innovation practices. Green Strategy (GS) has a mean of 0.6427 and standard deviation of 0.30029, indicating moderate variation in green strategy implementation across companies.

Classical Assumption Tests

Normality Test

Table 2. Normality Test – One-Sample Kolmogorov-Smirnov

Description	Value
N	36
Mean	0.0000000
Std. Deviation	1.27182083
Kolmogorov-Smirnov Z (Test Statistic)	0.116
Asymp. Sig. (2-tailed)	0.200

Source: Processed data, 2026

The Asymp. Sig. (2-tailed) value of 0.200 exceeds the 0.05 significance level, confirming that the residual data are normally distributed. The regression model therefore satisfies the normality assumption and is suitable for further analysis.

Multicollinearity Test

Table 3. Multicollinearity Test Results

Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	6.487	1.523		4.259	0.000		
CED (X1)	15.499	7.835	0.294	1.978	0.057	0.895	1.118
GI (X2)	-6.313	1.654	-0.586	-3.817	0.001	0.841	1.189
GS (X3)	-2.037	0.774	-0.383	-2.631	0.013	0.936	1.069

Source: Processed data, 2026

All variables have Tolerance values exceeding 0.10 and VIF values below 10 (CED: Tolerance = 0.895, VIF = 1.118; GI: Tolerance = 0.841, VIF = 1.189; GS: Tolerance = 0.936, VIF = 1.069), confirming that the regression model is free from multicollinearity.

Autocorrelation Test

Table 4. Autocorrelation Test – Durbin-Watson

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	0.605	0.366	0.306	1.3301	0.346

Source: Processed data, 2026

The Durbin-Watson value of 0.346 falls within the acceptable range of -2 to +2, confirming that the regression model is free from autocorrelation.

Heteroscedasticity Test

The heteroscedasticity test was conducted using the Glejser method. The results show that data points are scattered randomly above and below zero on the Y-axis without forming any specific pattern, indicating that no heteroscedasticity is present in the regression model. The classical assumption for homoscedasticity is therefore satisfied.

Hypothesis Testing

Partial Test (t-test)

Table 5. Partial Test Results (t-test)

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	6.487	1.523		4.259	0.000
CED (X1)	15.499	7.835	0.294	1.978	0.057
GI (X2)	-6.313	1.654	-0.586	-3.817	0.001
GS (X3)	-2.037	0.774	-0.383	-2.631	0.013

Source: Processed data, 2026

Carbon Emission Disclosure (CED): The partial test yields a significance value of 0.057 (> 0.05) and t-statistic of 1.978, which is below the t-table value of 2.028 ($n-k-1 = 36$, $\alpha = 5\%$). Therefore, H1 is rejected: Carbon Emission Disclosure does not have a significant effect on firm value.

Green Innovation (GI): The partial test yields a significance value of 0.001 (< 0.05) and absolute t-statistic of 3.817 ($> t$ -table of 2.028). Therefore, H2 is accepted: Green Innovation has a significant effect on firm value. The negative regression coefficient ($\beta = -6.313$) indicates a negative direction of influence.

Green Strategy (GS): The partial test yields a significance value of 0.013 (< 0.05) and absolute t-statistic of 2.631 ($> t$ -table of 2.028). Therefore, H3 is accepted: Green Strategy has a significant effect on firm value. The negative regression coefficient ($\beta = -2.037$) indicates a negative direction of influence.

Simultaneous Test (F-test)

Table 6. Simultaneous Test Results (F-test)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	32.639	3	10.880	6.150	0.002
Residual	56.613	32	1.769		
Total	89.253	35			

Source: Processed data, 2026

The F-test yields a significance value of 0.002 (< 0.05) with $F = 6.150$. Therefore, H4 is accepted: Carbon Emission Disclosure, Green Innovation, and Green Strategy simultaneously have a significant effect on firm value.

Coefficient of Determination (R^2)

Table 7. Coefficient of Determination Results

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0.605	0.366	0.306	1.33010

Source: Processed data, 2026

The Adjusted R Square of 0.306 indicates that Carbon Emission Disclosure, Green Innovation, and Green Strategy collectively explain 30.6% of the variation in firm value. The remaining 69.4% is attributable to other factors not included in this model, such as profitability, firm size, leverage, dividend policy, and macroeconomic conditions.

Discussion

Effect of Carbon Emission Disclosure on Firm Value

The findings show that Carbon Emission Disclosure does not have a significant effect on firm value ($\text{sig.} = 0.057 > 0.05$; $t = 1.978 < t\text{-table of } 2.028$), leading to the rejection of H1. This result contrasts with legitimacy theory, which posits that companies performing environmental disclosures will receive positive societal legitimacy and improved firm value. In practice, carbon emission disclosure in Indonesia remains relatively unpopular due to limited environmental awareness among market participants. Investors have not yet responded positively to carbon disclosure information, likely because they prioritise financial information over non-financial environmental disclosures (Matsumura et al., 2014). This finding aligns with the results of Anggita et al. (2022), who similarly found that carbon emission disclosure does not influence firm value, but contradicts Sari & Budiasih (2022) and Rahmanita (2018), who found a positive effect.

Effect of Green Innovation on Firm Value

The findings show that Green Innovation has a significant negative effect on firm value ($\text{sig.} = 0.001 < 0.05$; $\beta = -6.313$), leading to the acceptance of H2 with a directional result opposite to the stated hypothesis. This indicates that as Green Innovation activities increase, firm value tends to decline in the short term. This may be explained by the substantial investment costs associated with green innovation—including research and development, environmentally friendly technology adoption, and process transformation—which reduce short-term profitability. Investors appear to respond negatively to these costs rather than recognising the long-term benefits. This finding is consistent with Isfani & Pratama, who found that Green Innovation has a significant negative effect on firm value, but contradicts Trisyanto (2024) and Fanda & Dwijayanti (2024), who report positive effects.

Effect of Green Strategy on Firm Value

The findings show that Green Strategy has a significant negative effect on firm value ($\text{sig.} = 0.013 < 0.05$; $\beta = -2.037$), leading to the acceptance of H3 with a negative direction contrary to the stated hypothesis. The higher the level of Green Strategy implementation, the more firm value tends to decrease in the short term. This reflects the substantial costs involved in environmental strategy implementation, including investment in clean technology, waste management, energy efficiency, and other sustainability programmes. Investor responses suggest that they weigh short-term cost impacts more heavily than long-term strategic benefits. This result aligns with Silaban & Dewi, who found that environmental strategies have not yet meaningfully increased firm value, but contradicts Soewarno et al. (2018) and Purwanto (2021), who found positive effects.

Simultaneous Effect of CED, Green Innovation, and Green Strategy on Firm Value

The simultaneous F-test result ($F = 6.150$; $\text{sig.} = 0.002 < 0.05$) confirms that all three variables jointly and significantly affect firm value, accepting H4. Although Carbon Emission Disclosure does not have a significant independent effect, the combination of carbon disclosure, green innovation, and green strategy provides a collectively meaningful contribution to firm value. This finding suggests that investors evaluate a company's overall environmental commitment rather than individual sustainability components in isolation. From the perspective of legitimacy theory, the combined implementation of these three practices strengthens corporate legitimacy, thereby

enhancing reputation and firm value over time. The Adjusted R Square of 30.6% indicates that the model captures a meaningful share of the variation in firm value, with the remainder attributable to financial and macroeconomic factors not included in this study.

5. Conclusion

This study examined the effect of Carbon Emission Disclosure, Green Innovation, and Green Strategy on the firm value of manufacturing companies listed on the Indonesian Sharia Stock Index (ISSI) during the 2021–2024 period, using multiple linear regression with 40 data observations from 10 companies. Four main conclusions are drawn.

First, Carbon Emission Disclosure does not have a significant effect on firm value ($\text{sig.} = 0.057 > 0.05$; $t = 1.978$), leading to the rejection of H1. Carbon emission disclosure has not yet become a primary consideration for investors in valuing companies, as environmental information remains less influential than financial performance indicators in the Indonesian market context.

Second, Green Innovation has a significant negative effect on firm value ($\text{sig.} = 0.001 < 0.05$; $\beta = -6.313$), with H2 accepted with a negative direction. In the short term, the high investment costs of implementing green innovation reduce corporate profitability, generating a negative market response.

Third, Green Strategy has a significant negative effect on firm value ($\text{sig.} = 0.013 < 0.05$; $\beta = -2.037$), with H3 accepted with a negative direction. The implementation costs of environmental strategies have not been offset by commensurate short-term value creation as perceived by investors.

Fourth, Carbon Emission Disclosure, Green Innovation, and Green Strategy simultaneously have a significant effect on firm value ($\text{sig.} = 0.002 < 0.05$; $F = 6.150$; Adjusted $R^2 = 30.6\%$), accepting H4. Collectively, these three sustainability variables contribute meaningfully to firm value formation.

For company management, these findings recommend: (1) improving the quality and breadth of carbon emission disclosure to increase investor confidence; (2) emphasising the long-term economic benefits of green innovation when communicating with investors; and (3) integrating green strategy with clear performance metrics to demonstrate tangible value creation. For future researchers, it is recommended to incorporate additional variables such as profitability, firm size, leverage, and ESG scores, and to extend the study to other sectors or multi-country comparisons for more generalisable findings.

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