

Environmental, Social, Governance (ESG), Carbon Emissions, and Green Investment: Determinants of Firm Value in the Era of Sustainability

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ABSTRACT

Objective: This study investigates the influence of Environmental, Social, and Governance (ESG) scores, carbon emission intensity, and green investment on firm value in response to increasing climate change pressures and the growing importance of sustainability in investment decisions. **Method:** A quantitative approach was employed using purposive sampling on companies listed on the Indonesia Stock Exchange that reported ESG values from 2021 to 2024, with data analyzed through multiple linear regression. **Results:** The findings indicate that ESG scores significantly enhance firm value, demonstrating the importance of effective environmental, social, and governance management. Carbon emission intensity also affects firm value, suggesting that emission levels serve as indicators of environmental performance and sustainability risk perceptions. Furthermore, green investment shows a measurable impact on firm value, emphasizing the need for strategic allocation of sustainability-related capital to balance both short- and long-term financial outcomes. **Novelty:** This study provides empirical evidence from the Indonesian market on the combined effects of ESG performance, carbon emission intensity, and green investment on firm value, offering new insights into how sustainability dimensions shape corporate valuation in emerging economies

INTRODUCTION

In recent years, the world has faced increasingly extreme climate change. Climate change refers to a long-term shift in average temperatures and weather patterns that can occur globally. Climate change has a significant impact on the world, including droughts, human health problems, and environmental damage. One of the primary causes of the climate crisis is the high carbon emissions generated by human activities, particularly in the industrial and energy sectors [1]. The manufacturing industry is one of the largest global sources of carbon emissions, primarily through the burning of fossil fuels. In response to this crisis, the United Nations Framework Convention on Climate Change (UNFCCC) created the Paris Agreement in 2015. The Paris Agreement is an international agreement aimed at addressing increasingly extreme climate change. The Paris Agreement aims to limit global temperature rise to 1.5°C or no more than 2°C above pre-industrial levels [2]. The Paris Agreement has been signed by 198 countries and ratified by 195 countries [3]. Indonesia is one of the countries that has ratified the Paris Agreement and demonstrated its commitment by developing a national strategy to reduce carbon emissions.

Firm value is a crucial indicator for investors when making investment decisions. This value reflects both the current condition of the firm and its potential for future

growth [4]. It is crucial for firm to maintain their value, as firm value increases, investor confidence also rises. Firm value is generally measured using indicators such as Tobin's Q, price-to-book value (PBV), or share price. In this study, firm value is proxied using the Tobin's Q ratio. This ratio not only reflects investor perceptions but also considers the interests of creditors, as it includes liabilities or total debt in its formulation as part of the firm market value [5]. In addition to maximizing financial aspects, firm value encompasses other non-financial factors, including social responsibility, good governance, and environmental considerations. The Triple Bottom Line (TBL) concept also emphasizes the importance of achieving three aspects, namely profit, environment, and stakeholders [4]. Investors now look beyond financial aspects and also consider non-financial aspects in their decision-making. This aligns with the growing global attention to climate change issues, as companies that fail to address environmental concerns risk operational disruptions, a decline in market competitiveness, and a negative impact on firm value [6].

With the issue of climate change, the application of sustainability principles in companies is now gaining widespread attention. In applying sustainability principles, companies publish sustainability reports to disclose their non-financial performance. The preparation of sustainability reports in the business world is regulated by POJK Number 51 of 2017 concerning the Application of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies [7]. Currently, ESG has become one of the key factors considered by investors in their investment decisions, in response to climate change issues and the Sustainable Development Goals (SDGs) [8]. ESG is also one of the non-financial components that covers environmental, social, and governance sustainability aspects. However, in Indonesia, many companies still have not disclosed information about ESG. Therefore, the IDX is committed to promoting long-term sustainable investment and encouraging the increased application of ESG principles in the Indonesian capital market. The Indonesia Stock Exchange (IDX) has launched an ESG value initiative for listed companies as part of its effort to encourage transparency and accountability in sustainability reports [9]. This effort was carried out in collaboration with ESG rating agency Sustainalytics, a subsidiary of Morningstar, to assess the ESG ratings of companies listed on the IDX. Several previous studies have shown that ESG scores have no effect on firm value [10][11]. Other previous studies have shown that ESG scores do affect firm value [8].

Several non-financial factors can impact firm value, including carbon emission intensity. Carbon emission intensity reflects the amount of CO₂ gas released into the environment to produce one unit of gross value added. Carbon emission intensity reflects the amount of CO₂ gas released into the environment to produce one unit of gross value added [4]. Indonesia is one of the countries in the Asia Pacific region that contributes significantly to carbon emissions [12]. Based on data from Statistics Indonesia, the manufacturing, electricity, and gas supply sectors account for 71.90 percent of carbon emissions from the total emissions of all sectors [13]. Based on this data, the

manufacturing sector is the only business field that has experienced a 36 percent increase in emission intensity.. This shows that the environmental efficiency of this sector tends to decline. Previous studies have shown that carbon emission intensity affects firm value [14]. However, this contradicts research showing that carbon emission intensity does not affect firm value [4].

One form of commitment to sustainable development is through green investment. Green investment is capital investment that takes into account environmental impacts and carries out environmentally friendly activities in firm operations [15]. Green investment refers to capital investment that considers environmental impacts and incorporates environmentally friendly practices into firm operations [16]. Green investment aims to address environmental issues by mitigating the impact of firm activities [17]. This investment is necessary to reduce greenhouse gas emissions and air pollutants while maintaining the level of production and consumption of non-energy goods, ensuring no significant decline [18]. Therefore, green investment can be considered a corporate environmental responsibility that enhances a firm value in the eyes of investors and the public. Several previous studies have shown that green investment has not had a significant effect on firm value [19][20][21]. However, some studies have shown that green investment does affect firm value [15][16].

This study draws on Stakeholder Theory and Legitimacy Theory as its theoretical foundations. Stakeholder Theory explains the relationship between companies and stakeholders. This theory suggests that companies should not only focus on the interests of company owners and shareholders, but also consider their ability to meet the expectations of various stakeholders, including customers, investors, employees, suppliers, and the environment [22]. Meanwhile, Legitimacy Theory posits that the general perception is that desirable corporate actions must align with the norms, values, and culture of the surrounding community in order to gain public support [23]. If a company fails to follow existing norms or regulations, it will jeopardize the continuity of its operations. Public legitimacy is one aspect of sustainability in the business process. If business activities are not approved or violate norms, the company's activities cannot run well [19]. Therefore, companies must conduct their activities within the bounds of the norms and rules that apply in society. This study focuses on the environment and sustainability, which are directly related to public, social, and environmental interests. Thus, this theory is used in the study to explain and strengthen the relationship between corporate sustainability practices and company improvement.

Based on the above background, this research object uses companies listed on the Indonesia Stock Exchange during the period 2021-2024. This study focuses on the 2021-2024 period, which marks the continued implementation phase of POJK No. 51/2017, in line with the enactment of the Phase II Sustainable Finance Roadmap (2021-2025) [7]. This can encourage the integration of environmental, social, and governance aspects into sustainability practices. Most previous studies have focused on the energy and mining sectors with a relatively short observation period. To date, empirical findings regarding

the impact of green investment on firm value have yielded inconsistent results. This study also considers carbon emission intensity and ESG Score as sustainability variables relevant to firm value. Based on this, this study aims to determine the effect of ESG Score, carbon emission intensity, and green investment on firm value.

Hypothesis

The Effect of ESG Score on Firm Value

ESG is a measure of a company's sustainability performance that can be an important means of demonstrating transparency and accountability. The ESG Score has now become one of the key indicators for assessing a company's sustainability performance, encompassing environmental, social, and corporate governance aspects [24]. According to stakeholder theory, companies are not only responsible to shareholders but also to all parties affected by the company, such as employees, the community, the government, and the environment. A high ESG Score indicates that a company is effectively managing its ESG risks. From the perspective of legitimacy theory, ESG is also used as a means to gain public trust and maintain a good reputation. ESG Score can be seen as a mechanism to strengthen corporate legitimacy, especially given the increasing public attention to sustainability issues. Previous studies have shown that ESG has a significant effect on firm value [23][25]. This contrasts with other studies that show that ESG has no effect on firm value [10][11].

H1: ESG Score Affects Firm Value

The Effect of Carbon Emission Intensity on Firm Value

Based on stakeholder theory, companies have a responsibility to meet the expectations of stakeholders, including managing environmental impacts. One indicator of environmental impact management is carbon emission intensity. Carbon emission intensity reflects the amount of emissions produced by a company. The higher the carbon emission intensity, the less effective the company is in reducing carbon emissions. In legitimacy theory, companies that fail to manage environmental impacts will lose public legitimacy. Therefore, companies are considered inefficient in managing their environmental impacts, which can damage their image. Thus, high carbon emission intensity can create perceptions among stakeholders and lead to a decline in firm value. Reducing carbon emissions is a crucial action that demonstrates a commitment to environmental protection. Previous studies have shown that carbon emission intensity affects firm value [14]. However, this differs from studies that show that carbon emission intensity does not affect firm value [4].

H2: Carbon Emission Intensity Affects Firm Value

The Effect of Green Investment on Firm Value

Green investment is a form of corporate responsibility that mitigates environmental impacts and manages environmental aspects arising from company operations [19]. In stakeholder theory, spending funds on environmentally friendly activities demonstrates a corporation's responsibility towards its stakeholders. Green investment is viewed as a response to growing stakeholder expectations regarding

corporate environmental performance, which can help enhance public trust. In addition, according to legitimacy theory, companies implement green investment to obtain legitimacy from stakeholders and maintain social legitimacy [15]. This investment is not only aimed at generating economic profits but can also provide environmental protection and social welfare. This ultimately has an impact on increasing firm value. Previous studies have shown that green investment affects firm value [17][26][27]. Other studies show that green investment does not affect firm value [19][28].

H3: Green Investment Affects Firm Value

Conceptual Framework

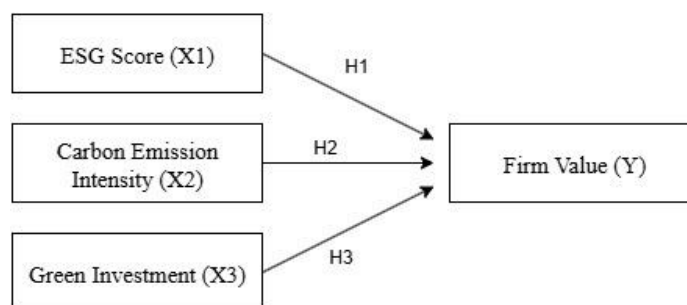


Figure 1. Conceptual Framework

RESEARCH METHOD

Type of Research

This study employs a quantitative approach, a research method that focuses on analyzing numerical data. The type of research used is causal associative research, which aims to determine the effect of independent variables on dependent variables [29]. The objects of this study are companies that reported ESG values on the Indonesia Stock Exchange between 2021-2024.

Types and Sources of Data

The type of data used in this study is secondary data obtained from the financial reports of companies listed on the Indonesia Stock Exchange (IDX) for the period from 2021 to 2024. The data was sourced from the official website of the Indonesia Stock Exchange www.idx.co.id and sustainability reports from the companies' official websites.

Population and Sample

The population in this study consists of companies listed on the IDX during the period from 2021 to 2024. The sample was selected using purposive sampling, a sampling technique that focuses on specific criteria established in accordance with the problem's focus and the study's objectives. These criteria were established to ensure that the data used were relevant and eligible for analysis in this study. There were several criteria used as the basis for determining the research sample, as follows:

Table 1. Sample Criteria

Research Sample Criteria	Total
Companies reporting ESG scores on the Indonesia Stock Exchange	85
(1) Companies that did not publish ESG Scores from 2021-2024 for 4 consecutive years	(61)
(2) Companies that did not consistently include information on Scope 1 and Scope 2 GHG emissions in their sustainability reports for 4 consecutive years from 2021-2024	(1)
(3) Companies that did not consistently include information on environmental expenditure costs for four consecutive years from 2021 to 2024 in their sustainability reports	(8)
(4) Companies that did not publish financial reports for four consecutive years from 2021 to 2024	(0)
Research Sample	15
Research Period	x4
Total of Samples	60
Outlier Data	(20)
Total Sample Data	40

Source: Determined by the researcher

Table 2. List of Companies

Stock Code	Company Name
ADRO	Alamtri Resources Indonesia Tbk
AMRT	Sumber Alfaria Trijaya Tbk
ANTM	Aneka Tambang Tbk
BBCA	Bank Central Asia Tbk
BBNI	Bank Negara Indonesia (Persero) Tbk
BBRI	Bank Rakyat Indonesia (Persero) Tbk
CPIN	Charoen Pokphand Indonesia Tbk
INKP	Indah Kiat Pulp & Paper Tbk
ITMG	Indo Tambangraya Megah Tbk
KLBF	Kalbe Farma Tbk
MDKA	Merdeka Copper Gold Tbk
MEDC	Medco Energi Internasional Tbk
PGAS	Perusahaan Gas Negara Tbk
SMGR	Semen Indonesia (Persero) Tbk
TOWR	Sarana Menara Nusantara Tbk

The independent variables used in this study are ESG Score, Carbon Emission Intensity, and Green Investment. Meanwhile, the dependent variable used is Firm Value with Tobin's Q as a proxy. The following is a table of operational variables:

Table 3. Operational Table

Variable	Definition	Indicator	Scale
ESG Score (X2)	ESG Score is an assessment of	ESG scores released by the IDX for 2021-2024 [30].	Ratio

	Environmental, Social, and Governance risks provided by Morningstar Sustainalytics [9].		
Carbon Emission Intensity (X1)	Carbon emission intensity reflects the amount of CO2 gas released into the environment to produce one unit of gross value added [4]	$CEI = \frac{\text{Scope 1} + \text{Scope 2 Emissions}}{\text{Total Sales}}$	Ratio
Green Investment (X3)	Green investment is a type of investment that supports environmental conservation, renewable energy development, clean air and water supply projects, and various sustainability-oriented activities [31].	$GI = \frac{\text{Total Environmental Cost}}{\text{Total Assets}}$	Ratio
Firm Value (Y)	Firm value is proxied using Tobin's Q with MVE, which is the market value of equity calculated by multiplying the number of outstanding shares by the share price at the end of the year [32]	$\text{Tobin's Q} = \frac{\text{MVE} + \text{Total Liabilities}}{\text{Total Assets}}$	Ratio

Data Analysis Techniques

Data analysis in this study was conducted using SPSS software to process and statistically test the data. The analysis stages were carried out systematically through several steps, which are explained as follows:

1. Descriptive Statistical Test

Descriptive statistical tests were performed to describe the research data, allowing for the determination of the distribution of data and the characteristics of the research data, including the minimum value, maximum value, mean, and standard deviation.

2. Classical Assumption Test

The classical assumption test was conducted to ensure that the regression model met the BLUE (Best Linear Unbiased Estimator) criteria, thereby ensuring the trustworthiness of the estimation results. The tests used included normality tests, heteroscedasticity tests, multicollinearity tests, and autocorrelation tests, which will be explained as follows:

a. Normality Test

This normality test aims to ensure that the residual data from the regression model is normally distributed. Normal residual distribution is important because it is one of the main assumptions in linear regression so that the parameter estimation results can be interpreted correctly. This normality test can be performed using several methods, such as the Kolmogorov-Smirnov Test or the Shapiro-Wilk Test. This study uses the Kolmogorov-Smirnov Test method. If the significance value of the normality test is > 0.05 , the residuals are declared to be normally distributed [29].

b. Heteroscedasticity Test

The heteroscedasticity test is performed to determine whether there is a difference in residual variance at each prediction level. Heteroscedasticity can lead to inefficient regression results. This test was performed by observing a scatterplot graph showing the relationship between the prediction value (ZPRED) and the residual (SRESID). The data was declared free from heteroscedasticity if the points on the graph were scattered randomly and did not form a specific pattern, either above or below the zero line. A random distribution pattern indicated that the residual variance was constant [29].

c. Multicollinearity Test

The multicollinearity test aims to determine whether there is a high correlation between independent variables in the model. Multicollinearity can interfere with the stability of regression coefficients. The test is conducted by looking at the Tolerance and Variance Inflation Factor (VIF) values. If the tolerance value is > 0.10 and $VIF < 10$, then the model is declared free of multicollinearity problems [29].

d. Autocorrelation Test

The autocorrelation test aims to ensure that the residuals between observations are not correlated with each other. This test is performed using the Durbin-Watson Test with the following interpretation criteria:

- (1) If the DW value is < -2 , it indicates positive autocorrelation.
- (2) If the DW value is between -2 and $+2$, it indicates no autocorrelation.
- (3) If the DW value is $> +2$, it indicates negative autocorrelation.

3. Multiple Linear Regression Analysis

This study employs an analytical method designed to test the formulated hypothesis. The analytical technique used is multiple linear regression using SPSS version 25. The analytical model applied can be explained as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Explanation:

Y = Firm Value

X1 = ESG Score

X2 = Carbon Emission Intensity

X_3 = Green Investment

α = Constant

β_1, β_2 = Regression Coefficients

ε = Error term

T-Test (Partial)

The partial test aims to measure the effect of each independent variable on changes in the dependent variable.

RESULTS AND DISCUSSION

Results

Descriptive Test Results

This study employs the independent variables of ESG Score, Carbon Emission Intensity, and Green Investment, while the dependent variable is firm value, measured using the Tobin's Q indicator.

Table 4. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ESG Score	40	17,83	45,07	29,8940	8,05944
Carbon Emission Intensity	40	,00	,00	,0000	,00000
Green Investment	40	,00	,00	,0010	,00126
Firm Value	40	,65	3,59	1,5218	,75314
Valid N (listwise)	40				

Source: SPSS Output

Based on Table 4, the ESG Score variable has a minimum value of 17.83 and a maximum value of 45.07, with an average of 29.8940 and a standard deviation of 8.05. This indicates that the ESG Score values of the sample companies vary significantly, revealing substantial differences between companies with low and high ESG values. The Carbon Emission Intensity variable exhibits the same minimum and maximum values of 0.0000, with a standard deviation of 0.0000. These results indicate that the carbon emission intensity data for all sample companies is constant, resulting in very low variation. The Green Investment variable has an average of 0.0010 with a standard deviation of 0.00126 and the same minimum and maximum values of 0.00. This indicates that most companies make only very small green investments, resulting in relatively limited variation between companies. The Firm Value variable has an average of 1.5218 with a standard deviation of 0.75, a minimum value of 0.65, and a maximum value of 3.59. This result reflects a considerable difference in firm value within the sample, where some companies have relatively low values and others have much higher values.

Classical Assumption Test Results

1. Normality Test

Tabel 5. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		40
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	,55129282
Most Extreme Differences	Absolute	,138
	Positive	,138
	Negative	-,059
Test Statistic		,138
Symp. Sig. (2-tailed)		,054 ^c

Source : SPSS Output

Table 5 shows the results of the Kolmogorov-Smirnov test, which indicate that the significance value of 0.054 is greater than the significance level of 0.05. This shows that the residual data is normally distributed, thus fulfilling one of the classical assumption tests in linear regression.

2. Heteroscedasticity Test

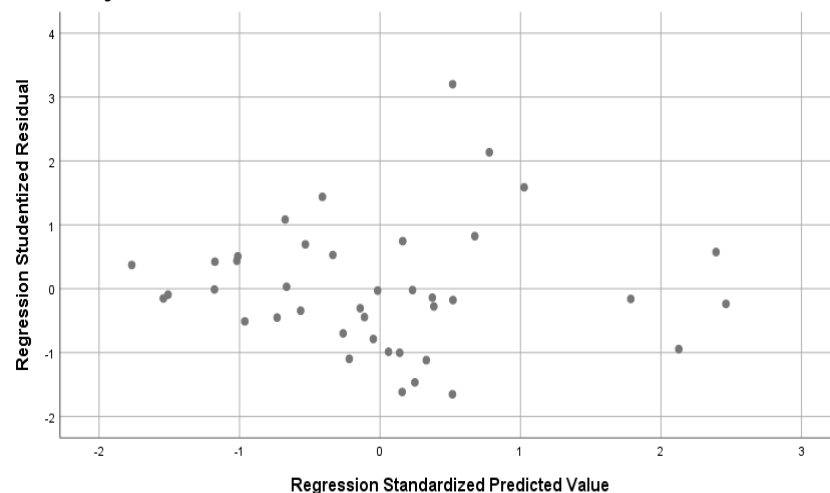


Figure 2. Scatterplot Dependent: Firm Value

Source : SPSS Output

The heteroscedasticity test was performed using the scatterplot method, observing the distribution pattern of points between the regression's standardized predicted value and the regression's studentized residual. The results show that the points are scattered randomly above and below the y-axis origin at 0. The distribution of these points does not form a clear pattern, such as a taper, spread, or wave. It can be concluded that the regression model in this study is free from heteroscedasticity, thus fulfilling the classical assumptions of linear regression.

3. Multicollinearity Test

Table 6. Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients		Collinearity		Statistics
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-,602	,478		-1,259	,216		
	ESG Score	,087	,018	,926	4,775	,000	,396	2,525
	Carbon Emission Intensity	-,4673787,427	,2252933,015	-,267	-2,075	,045	,901	1,110
	Green Investment	-,356,218	,119,778	-,596	-2,974	,005	,371	2,697

Source : SPSS Output

Based on Table 6, the tolerance value for the ESG Score variable is 0.396 and the VIF value is 2.525, the carbon emission intensity variable is 0.901 and the VIF is 1.110, and the green investment variable is 0.371 and the VIF value is 2.967. Overall, the independent variables have tolerance values >0.10 and VIF values <10, so this regression model is free from multicollinearity.

4. Autocorrelation Test

Table 7. Autocorrelation Test of Firm Value (Y)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,681 ^a	,464	,420	,57380	1,333

Source: SPSS Output

Based on the test results in Table 7, a Durbin-Watson value of 1.333 was obtained. This value is in the range of -2 to +2, indicating that there is no autocorrelation or strong autocorrelation in the model. Therefore, this regression model is suitable for use in the next hypothesis test.

Multiple Linear Regression Analysis Results

Table 8. Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-,602	,478		-1,259	,216
	ESG Score	,087	,018	,926	4,775	,000

Carbon Emission Intensity	-	2252933,01	4673787,4	5	27	-2,267	-2,075	,045
Green Investment	-356,218	119,778				-,596	-2,974	,005

a. Dependent Variable: Tobin's Q

Source: SPSS Output

The results of data processing through multiple regression analysis presented in Table 3.5 produced the following multiple linear regression equation:

$$Y = \beta_0 + \beta_1 X_1 - \beta_2 X_2 + \beta_3 X_3 + e$$

$$Y = -,602 + 0,087 X_1 - 4673787,427 X_2 - 356,218 X_3 + e$$

It can be concluded that:

- The intercept value (β_0) is negative, namely -0.602, which means that if the ESG Score, carbon emission intensity, and green investment are equal to zero (0), the firm value (Tobin's Q) will decrease.
- The ESG Score regression coefficient value is 0.087, which is significant. This indicates that if the ESG Score increases by 1%, the firm value (Tobin's Q) will increase by 0.087. It can be assumed that other variables remain constant.
- The regression coefficient value for carbon emission intensity is -4673787.427, which is significant. This indicates that if the carbon emission intensity variable increases by 1%, the firm value (Tobin's Q) will decrease by -4673787.427, assuming all other variables remain constant.
- The regression coefficient for green investment is -356.218. This means that if the green investment variable increases by 1%, the firm value (Tobin's Q) will decrease by -356.218, assuming that all other variables remain constant.

T-Test Result (Partial)

Table 9. Hypothesis Test (T-Test) Firm Value (Y)

Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-,602	,478		-1,259	,216
	ESG Score	,087	,018	,926	4,775	,000
	Carbon Emission Intensity	- 4673787,427	2252933,015	-,267	-2,075	,045
	Green Investment	-356,218	119,778	-,596	-2,974	,005

a. Dependent Variabel: Tobin's Q

Source: SPSS Output

Statistical testing of the ESG Score variable (X1) shows a t-value of 4.775 with a significance value of $0.000 < 0.05$. This suggests that the ESG Score has a substantial impact on a firm value. The Carbon Emission Intensity variable (X2) yields a t-value of -2.075 with a significance value of $0.045 < 0.05$, indicating that carbon emission intensity has a significant impact on firm value. The green investment variable (X3) shows a t-value of -2.974 and a significance value of $0.005 < 0.05$. This means that green investments have a significant impact on firm value.

R-Square Test

Table 10. Determination Coefficient Value of Firm Value (Y)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,681 ^a	,464	,420	,57380

a. Predictors: (Constant), ESG Score, Carbon Emission Intensity, Green Investment

b. Dependent Variable: Tobin's Q

Source: SPSS Output

Based on Table 10, the R-squared test results show that the adjusted R-squared has a value of 0.420, or 42%. This indicates that the ESG Score, carbon emission intensity, and green investment variables collectively account for 42% of the firm value, while the remaining 58% is influenced by other variables not included in this study.

Discussion

The Effect of ESG Score on Firm Value

The study's results show that the ESG Score has a significant impact on firm value. The t-test result obtained a value of 4.775 with a significance value of $0.000 < 0.05$. Thus, hypothesis 1, which states that ESG Score affects firm value, is accepted. The findings of this study suggest that the higher the ESG score, the better the company is perceived to be at managing ESG, leading to a significant increase in firm value. Companies with high ESG scores are considered to have reduced operational and legal risks, such as the risk of sanctions due to environmental pollution. Additionally, companies are also considered compliant with regulations and sustainability standards. Firm value reflects the market's or investors' valuation of a company. A high ESG Score is often considered an indicator that a company has good risk management and sustainable long-term growth prospects. In addition, companies with high ESG Scores are often viewed as more stable, resulting in lower capital costs because they have reduced the risk of sanctions due to environmental pollution [33]. This aligns with stakeholder theory, which posits that companies demonstrating good sustainability performance (environmental, social, and governance) can increase the trust of stakeholders, including investors, employees, and customers. In legitimacy theory, consistent application of ESG principles helps companies gain social support and a good reputation, and can increase market value. Thus, the ESG Score plays a crucial role in creating long-term value for companies.

Companies with strong ESG performance are considered more capable of managing environmental and social risks and have effective governance. These results are in line with studies [23][25] showing that ESG Score affects firm value.

The Effect of Carbon Emission Intensity on Firm Value

Based on the t-test results in Table 3.5, it is evident that carbon emission intensity has a significant effect on firm value, with a t-value of -2.075 and a significance level of 0.045. Hypothesis 2, which states that carbon emission intensity affects firm value, is rejected. The significant coefficient on carbon emission intensity indicates that the higher the emissions produced, the lower the firm value. This finding suggests that companies with high emission levels are perceived as having less efficient environmental performance, which can lead to perceptions of sustainability risk and influence the decisions of stakeholders who may switch to companies with better environmental performance. This is because companies are increasingly facing stringent regulatory risks, such as fines, environmental sanctions, carbon taxes, and reputational risks that can be detrimental, as well as costs arising from emissions that can erode company profits and stability [14]. There is a regulation, OJK No. 51/POJK.03/2017, which requires companies to prepare sustainability reports as a form of transparency in managing social and environmental impacts. Therefore, investors today consider not only financial aspects in their investment decisions, but also non-financial factors, including climate change and sustainability issues. This is not in line with stakeholder theory, which posits that companies must consider the interests of all stakeholders. When carbon emissions are too high, stakeholder expectations that companies are responsible for the environment are not met, thereby reducing stakeholder trust. In addition, these findings can be explained through legitimacy theory, which posits that companies must maintain public support by striking a balance between operational activities and social expectations [23]. A high emission ratio indicates that operational activities continue to have a significant environmental impact, which may lead to the public perception that the company faces reputational risks and environmental liabilities in the future. This study aligns with previous research, which has shown that carbon emission intensity impacts firm value [14].

The Effect of Green Investment on Firm Value

The study's results show that green investment has a significant impact on firm value. The t-test results obtained a value of -2.974 with a significance value of $0.005 < 0.05$. These results indicate that hypothesis 3 is accepted. These findings suggest that short-term green investments may have the potential to reduce a firm value. Meanwhile, the green investments conducted in this study from 2021 to 2024 are short-term investments. This is because the allocation of funds for sustainability projects requires large costs that can reduce net profit and cash flow during the current period. Additionally, the high cost of green investment also increases the risk of uncertainty over investment returns, as the economic benefits will only be realized in the long term [34]. As a result, the profitability ratio decreases, which in turn affects investors' perceptions of the company's

performance and can reflect a decline in firm value. From a legitimacy theory perspective, management's decision to make green investments is an effort to meet social and regulatory demands related to sustainability and to strengthen public perception. However, from the stakeholder perspective, the capital market tends to assess performance based on short-term results, so that the considerable costs of sustainability projects are considered to reduce shareholder returns. This study is in line with previous studies, which state that green investment affects firm value [17][26][27].

CONCLUSION

Fundamental Finding : The study concludes that ESG Score, carbon emission intensity, and green investment each have a significant influence on firm value. A higher ESG Score strengthens stakeholder confidence by demonstrating effective environmental, social, and governance management, while higher carbon emission intensity reduces firm value due to increased sustainability risks and perceived future losses. Green investment shows a negative short-term effect on firm value because substantial environmental expenditures initially depress profitability before long-term benefits materialize. **Implication :** These findings emphasize the strategic importance for companies to integrate sustainability into their core business practices. Firms must actively reduce carbon emissions, improve ESG performance, and plan green investments with long-term value creation in mind to maintain investor trust, enhance competitiveness, and ensure financial resilience. **Limitation :** This research is limited by the small sample size of 15 companies that consistently reported ESG data over four years. Many IDX-listed companies did not present complete sustainability reports, limiting the generalizability of the findings to the broader market. **Future Research :** Future studies should expand the sample across more sectors, extend the observation period to capture the long-term effects of green investment, include additional variables relevant to firm value, and utilize alternative analytical software such as EViews to enhance analytical rigor and comparability.

REFERENCES

- [1] N. O. and A. Administration, "Climate Change Impacts," NOAA. Accessed: Jun. 02, 2025. [Online]. Available: <https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts>
- [2] UNFCCC, "The Paris Agreement," United Nations Climate Change. Accessed: Jun. 02, 2025. [Online]. Available: <https://unfccc.int/process-and-meetings/the-paris-agreement>
- [3] W. Contributors, "List of parties to the Paris Agreement," Wikipedia. Accessed: Jun. 02, 2025. [Online]. Available: https://en.wikipedia.org/w/index.php?title=List_of_parties_to_the_Paris_Agreement&oldid=1292340325#References
- [4] H. Regita Andieni Dewantoro, "Pengaruh Intensitas Emisi Karbon , Biaya Lingkungan dan Budaya Organisasi Hijau Terhadap Nilai Perusahaan," vol. 3, no. 5, pp. 1634–1646, 2024.

- [5] S. Ana and D. T. Wibowo, "Nilai Perusahaan dalam Formula Tobin's Q Ratio," *MUQADDIMAH: Jurnal Ekonomi, Manajemen, Akuntansi dan Bisnis*, vol. 3, no. 1, pp. 126–135, 2025.
- [6] M. Muslim, "The Dilemma Between Shareholder Value and Long-term Business Sustainability," *Advances in Management & Financial Reporting*, vol. 3, no. 1, pp. 15–29, 2025, doi: 10.60079/amfr.v3i1.427.
- [7] H. Prayitno *et al.*, "Perkembangan Penilaian ESG di Indonesia," *The Reform Initiatives*, 2024.
- [8] C. P. Ida Ayu Putu and S. Devi, "Pengaruh Environmental Social Governance (ESG) Score dan Struktur Modal Terhadap Nilai Perusahaan," *JIMAT (Jurnal Ilmiah Mahasiswa Akuntansi) Undiksha*, vol. 15, no. 01, pp. 166–173, 2024, doi: 10.23887/jimat.v15i01.76346.
- [9] IDX, "Nilai ESG," Bursa Efek Indonesia (IDX). Accessed: Jun. 08, 2025. [Online]. Available: <https://www.idx.co.id/Id/Perusahaan-Tercatat/Nilai-ESG>
- [10] F. Kartika, A. Dermawan, and F. Hudaya, "Pengungkapan environmental, social, governance (ESG) dalam meningkatkan nilai perusahaan publik di Bursa Efek Indonesia," *SOSIOHUMANIORA: Jurnal Ilmiah Ilmu Sosial Dan Humaniora*, vol. 9, no. 1, pp. 29–39, 2023, doi: 10.30738/sosio.v9i1.14014.
- [11] I. P. Devianti, "Pengaruh Environment, Social, dan Governance (ESG) terhadap nilai perusahaan pada sektor pertambangan yang terdaftar di ESG Leaders Indonesia Periode 2017-2022," *Jurnal Ilmu Manajemen*, vol. 13, no. 1, pp. 159–173, 2024.
- [12] E. Institute, "Statistical Review of World Energy," Energy Institute. Accessed: Jun. 02, 2025. [Online]. Available: <https://www.energyinst.org/statistical-review>
- [13] Badan Pusat Statistik, "Neraca Arus Energi Dan Neraca Emisi Gas Rumah Kaca Indonesia Badan Pusat Statistik Bps-Statistics Indonesia," *Bps-Statistics Indonesia*, vol. 4, pp. 1–120, 2024.
- [14] S. Perdichizzi, B. Buchetti, A. F. Cicchiello, and L. Dal Maso, "Carbon Emission and Firms' Value: Evidence From Europe," *Energy Econ*, vol. 131, pp. 1–47, 2025.
- [15] A. K. Nurdiansyah, P. G. Lestari, and N. Heriyah, "Pengaruh Pengungkapan Emisi Karbon dan Green Investment Terhadap Nilai Perusahaan," *Universitas Informatika dan Bisnis Indonesia*, vol. 23, no. 1, pp. 227–236, 2024.
- [16] Ayu Wijayanti and Yoseph Agus Bagus Budi N., "Dampak Green Governance, Green Investment, Dan Green Innovation Terhadap Nilai Perusahaan," *Jurnal Ekonomi Trisakti*, vol. 4, no. 1, pp. 535–544, 2024, doi: 10.25105/jet.v4i1.19373.
- [17] N. M. I. Mentari and K. I. K. Dewi, "Moderasi CSR Disclosure Terhadap Pengaruh Green Investment Pada Nilai Perusahaan," *Jurnal Ilmiah Akuntansi dan Bisnis*, vol. 8, no. 1, pp. 60–71, 2023, doi: 10.38043/jiab.v8i1.4663.
- [18] A. Tanasya and S. Handayani, "Green Investment Dan Corporate Governance Terhadap Nilai Perusahaan: Profitabilitas Sebagai Pemediasi," *Jurnal Bisnis dan Akuntansi*, vol. 22, no. 2, pp. 225–238, 2021, doi: 10.34208/jba.v22i2.727.
- [19] N. A. N. Aeni and E. Murwaningsari, "Pengaruh Pengungkapan Emisi Karbon Dan Investasi Hijau Terhadap Nilai Perusahaan," *Jurnal Ekonomi Trisakti*, vol. 3, no. 2, pp. 3135–3148, 2023, doi: 10.25105/jet.v3i2.17890.
- [20] H. T. Agatha and T. Aryati, "Pengaruh Volume Emisi Karbon, Pengungkapan Emisi Karbon, Dan Tata Kelola Perusahaan Terhadap Nilai Perusahaan," *Journal Of Social Science Research*, vol. 4, no. 4, pp. 16288–16308, 2024, doi: 10.25105/jet.v3i2.17992.

- [21] A. R. Larasati, N. Arimuljarto, and Z. Azhar, "Pengaruh Green Investment Dan Kinerja Keuangan Terhadap Nilai Perusahaan Pada Perusahaan Industri Pertambangan Yang Terdaftar Di Bursa Efek Indonesia Tahun 2017-2022," *NAMARA: Jurnal Manajemen Pratama*, vol. 1, no. 1, pp. 1-22, 2024, [Online]. Available: <https://namara-feb.unpak.ac.id/index.php/namara/index>
- [22] F. A. N. Zulfa, "PENGARUH GREEN INVESTMENT, DIVIDEN, DAN LEVERAGE TERHADAP NILAI PERUSAHAAN DENGAN PROFITABILITAS SEBAGAI MODERASI," *Fakultas Ekonomi*, pp. 1-123, 2024.
- [23] L. Rahelliamelinda and J. Handoko, "Profitabilitas Sebagai Moderating Pengaruh Kinerja Esg, Green Innovation, Eco-Efficiency Terhadap Nilai Perusahaan," *Jurnal Informasi, Perpajakan, Akuntansi, Dan Keuangan Publik*, vol. 19, no. 1, pp. 145-170, 2024, doi: 10.25105/jipak.v19i1.19191.
- [24] V. A. Agustine, H. N. Angraini, I. M. Riandy, and A. Lastiati, "Dampak ESG Score Terhadap Profitabilitas Perusahaan," *International & National Conference on Accounting and Fraud Auditing*, vol. 5, no. 2, pp. 1-9, 2024.
- [25] S. Grishunin, E. Naumova, E. Burova, S. Suloeva, and T. Nekrasova, "The Impact of Sustainability Disclosures on Value of Companies Following Digital Transformation Strategies," *International Journal of Technology*, vol. 13, no. 7, pp. 1432-1441, 2022, doi: 10.14716/ijtech.v13i7.6194.
- [26] D. S. Mubarak, M. Hikmah, and Y. Oktaviani, "Influence of Green Investment and Firm Size on Firm Value of Sector Energy Firm Listed on Idx 2018-2022," *Iqtishaduna : International Conference Proceeding*, vol. 1, pp. 40-45, 2025, doi: 10.54783/wp25c635.
- [27] W. Yusnia, N. Hidayah, and P. S. Utami, "Effectiveness of Implementing Green Finance, Green Investment, and Environment Cost in Increasing Firm Value in The Mining Sector," *Jurnal Distribusi Universitas Mataram*, vol. 12, no. 2, pp. 323-338, 2024.
- [28] A. P. Nuurhasanah and A. Haq, "Pengaruh Pengungkapan Emisi Karbon, Inovasi Hijau, dan Investasi Hijau Terhadap Nilai Perusahaan," *EKOMA : Jurnal Ekonomi, Manajemen, Akuntansi*, vol. 3, no. 5, pp. 2287-2297, 2024.
- [29] I. Ghazali, *Aplikasi Analisis Multivariate dengan Program IBM SPSS 26*, 10th ed. Universitas Diponegoro, 2021.
- [30] P. W. Anggraini and T. D. R. Sari, "Pengaruh Environment Social Governance (ESG) Score Terhadap Kinerja Keuangan Perusahaan Yang Terindeks IDX ESG Leader Tahun 2020-2023," *Journal of Accounting and Finance Management*, vol. 5, no. 5, pp. 975-982, 2024.
- [31] Fathiyah Alifah Fitriyani, Gilbert Rely, and Pratiwi Nila Sari, "Pengaruh Green Investment, Eco Efficiency dan Good Corporate Governance Terhadap Nilai Perusahaan," *Jurnal Akuntansi, Keuangan, Perpajakan dan Tata Kelola Perusahaan*, vol. 2, no. 3, pp. 890-904, 2025, doi: 10.70248/jakpt.v2i3.1953.
- [32] L. Widyastuti, "Hubungan Pengungkapan Corporate Social Responsibility (CSR) Terhadap Nilai Perusahaan dengan Earnings Management Sebagai Variabel Moderasi," pp. 1-27, 2021.
- [33] A. K. Arditiyan and A. Purwanto, "Pengaruh ESG terhadap Cost of Capital selama Pandemi dengan Moderasi Kinerja Keuangan," *Owner: Riset & Jurnal Akuntansi*, vol. 9, no. 2, pp. 1304-1317, 2025.

- [34] N. Hafsah, "PENGARUH GREEN INVESTMENT DAN RETURN ON ASSET TERHADAP NILAI PERUSAHAAN DENGAN EFISIENSI BANK SEBAGAI VARIABEL MODERASI," *Fakultas Ekonomi dan Bisnis Islam*, vol. 11, no. 1, pp. 1-14, 2025, [Online].

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