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The Effect of Environmental Disclosure and Green Innovation on Firm Value: The Role of GCG

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ABSTRACT

This study examines the effect of environmental disclosure and green innovation on firm value, with Good Corporate Governance (GCG) serving as a moderating variable. Previous studies have reported inconsistent findings regarding the relationship between sustainability practices and firm value, indicating the need for further investigation, particularly in emerging market contexts. This study employs a quantitative approach using panel data obtained from property and real estate companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The data were analyzed using panel data regression and Moderated Regression Analysis (MRA). The findings reveal that environmental disclosure negatively affects firm value, indicating that sustainability disclosure in emerging markets is not always perceived positively by investors. Green innovation does not significantly influence firm value, suggesting that environmentally oriented innovation activities have not yet been fully appreciated by the market. In contrast, Good Corporate Governance has a positive effect on firm value and strengthens the relationship between green innovation and firm value. However, GCG does not strengthen the relationship between environmental disclosure and firm value. The findings imply that strong governance mechanisms enhance the effectiveness and credibility of sustainability-oriented innovation strategies, thereby increasing investor confidence and market valuation. This study also indicates that environmental disclosure alone may not improve firm value unless supported by credible implementation and transparent governance practices. Therefore, companies are encouraged to integrate sustainability initiatives into long-term business strategies rather than relying solely on symbolic disclosures. Theoretically, this study contributes to legitimacy theory, signaling theory, stakeholder theory, and corporate governance theory by demonstrating that investor responses toward sustainability practices are influenced by governance quality and market perceptions in emerging economies. These findings contribute to the literature on sustainability, innovation, and corporate governance in developing-country contexts.

Keywords: *Environmental Disclosure, Green Innovation, Firm Value, Good Corporate Governance, Moderating Variable*

1. Introduction

Corporate sustainability has become a central issue in the contemporary business environment because companies are no longer evaluated solely based on financial performance, but also on their ability to balance economic, environmental, and social responsibilities. The growing global concern regarding climate change, environmental degradation, and social accountability has encouraged companies to integrate sustainability principles into their business strategies and reporting practices. Sustainability implementation is increasingly associated with Environmental, Social, and Governance (ESG) practices, which are considered capable of improving corporate competitiveness, reducing business risks, and strengthening long-term firm value (Yawika & Handayani, 2019; Li et al., 2018; Melinda & Wardhani, 2020; Kim & Yang, 2026). In emerging economies such as Indonesia, sustainability issues are becoming more relevant due to increasing stakeholder awareness and the development of sustainability-related regulations and reporting standards (Kallisia et al., 2025; Kurniawan et al., 2025).

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Consequently, companies are expected not only to generate profits but also to demonstrate accountability toward environmental preservation and sustainable business practices.

Firm value is one of the most important indicators reflecting investor perceptions regarding a company's performance, future prospects, and sustainability capability. Higher firm value generally indicates stronger market confidence in a company's ability to generate sustainable returns and maintain long-term growth (Indrawati et al., 2023; Sugosha & Artini, 2020). In this context, sustainability-related activities such as environmental disclosure and green innovation have increasingly become strategic considerations for investors in evaluating corporate quality and credibility. According to legitimacy theory, companies disclose environmental information to gain social legitimacy and maintain stakeholder support, while signaling theory explains that sustainability disclosure can serve as a positive signal regarding the company's long-term performance and risk management capability (Mio et al., 2020; Kurniawan et al., 2025). Therefore, environmental transparency and innovation are expected to strengthen investor confidence and positively affect firm value.

Environmental disclosure has emerged as an important mechanism for communicating a company's environmental responsibility and sustainability commitment to stakeholders. Companies with better environmental performance tend to disclose environmental information voluntarily to enhance transparency, legitimacy, and corporate reputation (Deswanto & Siregar, 2018; Doan & Sassen, 2020). Moreover, the credibility and quality of environmental disclosure have become essential factors influencing stakeholder trust and investment decisions (Balluchi et al., 2021; Saraswati et al., 2022). Several previous studies found that environmental disclosure positively affects firm value because investors perceive sustainability reporting as an indication of lower business risk and better long-term prospects (Aboud & Diab, 2018; Wu & Li, 2023; Sumarno et al., 2023). However, other studies revealed inconsistent findings, indicating that environmental disclosure does not always improve firm value, particularly in emerging markets where sustainability reporting may still be perceived as symbolic or merely intended to comply with regulations (Melinda & Wardhani, 2020; Abdi et al., 2022). These inconsistent results indicate the existence of a research gap regarding the effectiveness of environmental disclosure in enhancing firm value.

Besides environmental disclosure, green innovation has also become an important strategic approach for achieving business sustainability and competitive advantage. Green innovation refers to the development of environmentally friendly products, technologies, and operational processes aimed at reducing environmental impact while improving efficiency and corporate performance (Li et al., 2020; El-Kassar & Kumar, 2019). Companies implementing green innovation are generally considered more adaptive, innovative, and responsive to sustainability challenges, thereby increasing stakeholder trust and market competitiveness (Hardiyansah & Agustini, 2021; Husnaini & Tjahjadi, 2021). Green innovation may also improve operational efficiency, reduce environmental costs, and create differentiation advantages that support long-term business sustainability (Agustia et al., 2019; Liu, 2024). Several studies confirmed that green innovation positively affects firm value because investors perceive environmentally innovative companies as having stronger growth potential and lower environmental risks (Pan, 2022; Zhang et al., 2020). Nevertheless, other studies found insignificant or temporary effects due to high implementation costs, uncertainty regarding returns, and varying investor perceptions toward sustainability investments (Xie et al., 2022; Damas & Tarisa, 2022). These contradictory findings demonstrate that sustainability strategies alone may not be sufficient to increase firm value without adequate governance support.

One factor that may explain these inconsistent findings is Good Corporate Governance (GCG). Corporate governance plays an essential role in ensuring that sustainability practices are implemented effectively, transparently, and consistently with shareholder interests. Corporate governance theory explains that effective governance mechanisms reduce agency conflicts, improve managerial accountability, and strengthen corporate transparency, thereby increasing stakeholder confidence in corporate sustainability initiatives (Fatma & Chouaibi, 2021; Kusuma

& Nuswantara, 2021). Strong governance structures, such as board effectiveness, managerial oversight, transparency, and audit independence, may enhance the credibility of environmental disclosure and green innovation practices, making investors more likely to respond positively to sustainability-related activities (Karina & Setiadi, 2020; Kartika, 2021). Conversely, weak governance may reduce investor trust and increase skepticism regarding whether sustainability activities are implemented substantively or merely symbolically.

Several previous studies have demonstrated the moderating role of GCG in strengthening the relationship between sustainability practices and firm value. Research by Blesia et al. (2023), Susanti and Handayani (2022), and Permatasari and Widianingsih (2020) showed that governance mechanisms can strengthen the effect of sustainability disclosure on firm value. Similarly, Samhadi et al. (2024) and Aprilya and Marrung (2025) found that GCG enhances the influence of green innovation and environmental disclosure on firm value. In addition, studies by Suhadak et al. (2019) and Jannah and Sartika (2022) confirmed that effective governance contributes significantly to improving firm performance and investor confidence. However, despite the growing literature on sustainability and firm value, empirical evidence regarding the moderating role of GCG in the relationship between environmental disclosure, green innovation, and firm value remains limited, particularly in the context of Indonesian property and real estate companies. Most prior studies focused primarily on direct effects and did not comprehensively explain how governance mechanisms influence the effectiveness of sustainability strategies.

The property and real estate sector in Indonesia represents an important research context because the industry has significant environmental impacts through land use, construction activities, energy consumption, and carbon emissions. Companies in this sector are increasingly required to adopt environmentally responsible practices and disclose sustainability-related information transparently. However, the implementation quality of sustainability strategies and governance mechanisms may vary across firms, creating differences in investor responses and firm value outcomes. Therefore, investigating the role of GCG in this sector becomes important to better understand how governance quality influences the effectiveness of environmental disclosure and green innovation in increasing firm value.

Based on the research gap and inconsistencies in previous findings, this study aims to examine the effect of environmental disclosure and green innovation on firm value with Good Corporate Governance as a moderating variable in property and real estate companies listed on the Indonesia Stock Exchange. The novelty of this study lies in the integration of environmental disclosure, green innovation, and GCG within a single research framework to explain firm value in the context of emerging markets, particularly Indonesia. Unlike previous studies that mainly focused on direct relationships, this study emphasizes the strategic role of governance in strengthening the credibility and effectiveness of sustainability practices. The study also contributes theoretically by integrating legitimacy theory, signaling theory, corporate governance theory, and the resource-based view to explain the relationship between sustainability strategies and firm value. Practically, the findings are expected to provide insights for companies, investors, and policymakers regarding the importance of governance quality in enhancing sustainability performance, investor confidence, and long-term corporate value.

2. Literature Review

Legitimacy Theory

Legitimacy theory explains that companies continuously seek to ensure that their operations and business activities are aligned with societal values, norms, and expectations in order to gain and maintain public acceptance (Mio et al., 2020; Balluchi et al., 2021). In the context of corporate sustainability, legitimacy becomes increasingly important because stakeholders expect companies not only to pursue profitability but also to demonstrate

environmental and social responsibility through transparent and accountable business practices (Kim & Yang, 2026; Kallisia et al., 2025). Companies that fail to meet stakeholder expectations regarding environmental responsibility may experience legitimacy threats, reputational decline, and reduced investor confidence.

One of the main strategies used by companies to maintain legitimacy is environmental disclosure. Environmental disclosure functions as a communication mechanism through which companies provide information regarding environmental performance, sustainability initiatives, carbon emissions, and environmental risk management to stakeholders (Deswanto & Siregar, 2018; Doan & Sassen, 2020). Through transparent environmental disclosure, companies attempt to demonstrate compliance with environmental regulations, social expectations, and sustainability standards, thereby strengthening corporate legitimacy and stakeholder trust (Balluchi et al., 2021; Saraswati et al., 2022). In addition, ESG disclosure has increasingly become an important indicator for investors in evaluating corporate sustainability and long-term business prospects (Li et al., 2018; Abdi et al., 2022).

From the perspective of legitimacy theory, companies that disclose environmental information more extensively are expected to gain stronger social acceptance because such disclosures reflect accountability and commitment toward sustainable business practices. Strong legitimacy can improve corporate reputation, reduce reputational risk, strengthen stakeholder relationships, and ultimately increase firm value (Aboud & Diab, 2018; Sumarno et al., 2023). Moreover, environmental disclosure may signal that the company is capable of managing environmental risks and adapting to sustainability-related regulations, which can positively influence investor perceptions (Wu & Li, 2023).

However, the relationship between environmental disclosure and firm value remains inconclusive. Several studies reported that environmental disclosure positively affects firm value because investors perceive sustainability practices as indicators of long-term competitiveness and lower business risk (Aboud & Diab, 2018; Li et al., 2018). In contrast, other studies found insignificant or inconsistent effects, particularly in emerging markets where sustainability disclosure may still be viewed as symbolic reporting or associated with higher compliance costs and reduced profitability (Melinda & Wardhani, 2020; Abdi et al., 2022). This inconsistency indicates that the effectiveness of environmental disclosure in increasing firm value may depend on how stakeholders perceive the credibility and economic implications of the disclosure.

Based on legitimacy theory and previous empirical findings, the first hypothesis of this study is formulated as follows:

H1: Environmental disclosure has an effect on firm value.

Stakeholder Theory

Stakeholder theory states that companies must consider the interests and expectations of various stakeholders, including shareholders, creditors, customers, governments, employees, and society, in order to achieve long-term sustainability and maintain organizational success. Companies are expected to create value not only for shareholders but also for broader stakeholders through responsible and sustainable business practices (Yawika & Handayani, 2019; Kim & Yang, 2026). Therefore, sustainability-related activities such as green innovation and environmental responsibility become essential because they help companies maintain positive stakeholder relationships and strengthen organizational legitimacy.

Green innovation refers to the development and implementation of environmentally friendly products, technologies, and operational processes aimed at reducing environmental impact while improving efficiency and competitiveness (Li et al., 2020; El-Kassar & Kumar, 2019). Green innovation reflects a company's proactive commitment to sustainability because it enables firms to reduce pollution, optimize resource utilization, improve energy efficiency, and create environmentally responsible products and services (Liu, 2024). In addition, green innovation can strengthen a company's competitive advantage by improving operational

efficiency, reducing environmental costs, and enhancing corporate reputation in the eyes of stakeholders (Agustia et al., 2019; Husnaini & Tjahjadi, 2021).

From the stakeholder perspective, companies that actively invest in green innovation are more likely to gain stakeholder support because they demonstrate responsiveness to environmental concerns and long-term sustainability commitments. Investors may perceive green innovation as an indication that the company possesses strong adaptive capability, innovation capacity, and future growth potential (Pan, 2022; Zhang et al., 2020). Consequently, companies implementing green innovation are expected to achieve better financial performance and higher firm value.

Nevertheless, the impact of green innovation on firm value may not always be immediate or consistent. Green innovation often requires substantial investment costs, long development periods, technological uncertainty, and significant resource allocation (Xie et al., 2022). Therefore, some investors may perceive sustainability investments as risky or less profitable in the short term, particularly in emerging markets where environmental awareness and sustainability-oriented investment behavior are still developing (Damas et al., 2021). Previous empirical studies also reported inconsistent findings regarding the relationship between green innovation and firm value. Several studies found a positive relationship between green innovation and firm value (Pan, 2022; Liu, 2024), while others reported insignificant effects due to high implementation costs and uncertain economic benefits (Xie et al., 2022).

Based on stakeholder theory and previous empirical evidence, the second hypothesis of this study is formulated as follows:

H2: Green innovation has a significant effect on firm value.

Signaling Theory

Signaling theory explains that companies disclose information to reduce information asymmetry between management and external stakeholders, particularly investors (Kurniawan et al., 2025). Sustainability-related information such as environmental disclosure and green innovation can function as strategic signals that communicate a company's sustainability commitment, managerial quality, future growth prospects, and long-term competitiveness (Li et al., 2018; Zhang et al., 2020). Through these signals, companies attempt to convince investors that they possess effective management capabilities and sustainable business strategies capable of generating long-term value.

Environmental disclosure can serve as a positive signal because transparent sustainability reporting demonstrates that the company is committed to environmental accountability and capable of managing environmental risks effectively (Deswanto & Siregar, 2018; Wu & Li, 2023). Likewise, green innovation may signal that the company possesses strong innovation capability, adaptability, and long-term strategic orientation toward sustainability (Li et al., 2020; El-Kassar & Kumar, 2019). Investors are more likely to respond positively to sustainability-related signals when they perceive such activities as credible and capable of improving future business performance and reducing corporate risk (Aboud & Diab, 2018; Pan, 2022).

However, sustainability signals are not always interpreted positively by investors. In many cases, investors may question whether environmental disclosure and green innovation reflect genuine sustainability commitment or merely symbolic actions intended to improve corporate image and legitimacy. Sustainability disclosure may also be associated with greenwashing practices, excessive compliance costs, or managerial opportunism if companies fail to demonstrate transparency and accountability (Balluchi et al., 2021; Melinda & Wardhani, 2020). Therefore, the credibility of sustainability signals becomes highly important in determining investor responses and firm value outcomes.

In this context, Good Corporate Governance (GCG) plays an important role in strengthening the credibility and effectiveness of sustainability signals. Corporate governance mechanisms such as board independence, managerial accountability, audit quality,

transparency, and effective monitoring systems can reduce agency conflicts and information asymmetry between managers and shareholders (Fatma & Chouaibi, 2021; Kusuma & Nuswantara, 2021). Strong governance ensures that environmental disclosure and green innovation are implemented consistently, transparently, and aligned with long-term corporate objectives rather than merely functioning as symbolic reporting practices (Karina & Setiadi, 2020; Kartika, 2021).

From the signaling perspective, companies with strong governance quality are more likely to gain investor trust because governance mechanisms increase the reliability and credibility of sustainability-related information (Suhadak et al., 2019; Jannah & Sartika, 2022). Investors may perceive environmental disclosure as more credible when companies demonstrate strong governance practices that support transparency and accountability (Blesia et al., 2023). Similarly, governance quality can strengthen the positive impact of green innovation because investors believe that companies with effective governance are better able to manage innovation risks, allocate resources efficiently, and convert sustainability investments into long-term economic value (Samhadi et al., 2024; Aprilya & Marrung, 2025).

Conversely, weak governance may reduce the effectiveness of sustainability signals because investors may suspect opportunistic behavior, greenwashing, or inefficient use of corporate resources. As a result, sustainability strategies may fail to improve firm value when not supported by effective governance mechanisms (Permatasari & Widianingsih, 2020; Susanti & Handayani, 2022). Therefore, the moderating role of GCG becomes important in explaining why environmental disclosure and green innovation may generate different impacts on firm value across companies.

Based on signaling theory and previous empirical findings, the following hypotheses are formulated:

H3: Good Corporate Governance moderates the relationship between environmental disclosure and firm value.

H4: Good Corporate Governance moderates the relationship between green innovation and firm value.

Good Corporate Governance on Firm Value

Good Corporate Governance (GCG) refers to a system of principles, structures, and mechanisms designed to regulate and control corporate management in order to ensure accountability, transparency, fairness, responsibility, and independence in business operations. According to corporate governance theory and agency theory, effective governance mechanisms can reduce agency conflicts and information asymmetry between managers and shareholders, thereby improving managerial accountability and investor confidence (Fatma & Chouaibi, 2021; Kusuma & Nuswantara, 2021). Companies implementing strong governance practices are generally perceived as more transparent, reliable, and capable of managing risks efficiently, which positively influences market perceptions and firm value (Suhadak et al., 2019). In emerging markets such as Indonesia, governance quality becomes increasingly important because investors often face higher uncertainty and weaker institutional environments. Therefore, companies with stronger governance mechanisms tend to attract greater investor trust and achieve higher firm value (Kartika, 2021; Jannah & Sartika, 2022).

Several previous studies have shown that Good Corporate Governance positively affects firm value. Kartika (2021) found that governance quality improves firm value through stronger transparency and accountability, while Suhadak et al. (2019) explained that governance mechanisms enhance corporate value by increasing investor confidence and improving financial performance. Similarly, Karina and Setiadi (2020) emphasized that effective governance strengthens corporate credibility and market responses toward company performance. Based on corporate governance theory and previous empirical findings, Good Corporate Governance is expected to improve firm value because effective governance mechanisms support better

decision-making, reduce agency conflicts, strengthen stakeholder trust, and enhance sustainable corporate performance. Therefore, the following hypothesis is proposed:
H5: Good Corporate Governance has a positive effect on firm value.

3. Methods

This study employs a quantitative research approach using panel data regression analysis to examine the effect of environmental disclosure and green innovation on firm value, with Good Corporate Governance (GCG) acting as a moderating variable. The study utilizes secondary data obtained from annual reports and sustainability reports of property and real estate companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The population of this study consists of all property and real estate companies listed on the IDX within the observation period. The sample was selected using purposive sampling to ensure that the companies met the objectives of the study. The criteria used in selecting the sample include: (1) companies consistently listed on the Indonesia Stock Exchange during 2020–2024, (2) companies publishing complete annual reports during the observation period, (3) companies disclosing environmental-related information in their annual or sustainability reports, and (4) companies having complete data related to all research variables. Based on these criteria, 20 companies were selected, resulting in 100 firm-year observations.

This study uses secondary data because such data provide publicly available and standardized information regarding financial performance, governance practices, environmental disclosure, and innovation activities. The data were collected from the official Indonesia Stock Exchange website, company annual reports, and sustainability reports. However, the use of annual and sustainability reports also has limitations because the disclosed information depends on managerial reporting policies and may contain subjective or symbolic disclosures. To improve data validity and reliability, this study adopts measurement indicators from previous empirical studies and applies consistent scoring procedures across all observations.

The dependent variable in this study is firm value, which is measured using Tobin's Q ratio. Tobin's Q is calculated by dividing the market value of equity plus total debt by total assets, reflecting the market's perception of the company's overall value and future growth prospects. Environmental disclosure is measured using an Environmental Disclosure Index based on disclosure items reported in annual and sustainability reports. Each disclosed environmental item is scored "1" and "0" otherwise, and the total score is divided by the total number of disclosure items. The measurement of environmental disclosure is based on the Global Reporting Initiative (GRI) Standards and previous empirical studies. Green innovation is measured based on environmentally friendly innovation activities disclosed in company reports, including eco-friendly products, energy efficiency initiatives, waste reduction programs, and the implementation of green technologies. A disclosure scoring approach is used to assess the intensity of green innovation activities, following the measurement approach developed by Hardiyansah and Agustini (2021). Meanwhile, Good Corporate Governance (GCG) is measured using a governance index consisting of several governance indicators, including board independence, institutional ownership, managerial ownership, audit committee effectiveness, and board size. The governance index is calculated using a scoring method based on governance-related disclosures in annual reports.

To analyze the relationship among variables, this study applies panel data regression analysis and Moderated Regression Analysis (MRA). The regression model is formulated as follows:

$$FV_{it} = \alpha + \beta_1 ED_{it} + \beta_2 GI_{it} + \beta_3 GCG_{it} + \beta_4 (ED_{it} \times GCG_{it}) + \beta_5 (GI_{it} \times GCG_{it}) + \varepsilon_{it}$$

Where:

- FV_{it} = Firm value of company i in year t
- ED_{it} = Environmental disclosure
- GI_{it} = Green innovation
- GCG_{it} = Good Corporate Governance
- ε_{it} = Error term

The data analysis was conducted using EViews 12 software. Several analytical procedures were performed, beginning with descriptive statistics analysis to describe the characteristics of the research variables, including mean, minimum, maximum, and standard deviation values. Furthermore, panel data model selection was conducted using the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test to determine the most appropriate regression model. Based on these tests, the Random Effect Model (REM) was selected as the most suitable estimation model for this study. To ensure the validity of the regression model, several classical assumption tests were also conducted, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests.

Hypothesis testing was conducted using the F-test to examine the simultaneous effect of the independent variables on firm value and the t-test to examine the partial effect of each independent variable. In addition, Moderated Regression Analysis (MRA) was employed to analyze the moderating role of Good Corporate Governance in the relationship between environmental disclosure, green innovation, and firm value. Finally, the coefficient of determination (R2R2) was used to measure the explanatory power of the independent variables in explaining variations in firm value.

4. Result and Discussion

Descriptive Statistical Analysis

Descriptive statistics are used to describe the characteristics of the research variables through minimum, maximum, mean, and standard deviation values. The results of the descriptive statistical analysis are presented in Table 1.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Firm Value	100	0.770000	18.3600	2.241100	3.008151
Environmental Disclosure	100	0.180000	86.9700	59.07440	19.07389
Green Innovation	100	0.142900	1.00000	0.711416	0.195776
GCG	100	0.540000	0.87000	0.728800	0.098219
Valid N (listwise)	100				

Source: Data Processed EViews 12

Based on Table 1, the firm value variable has a mean value of 2.2411 and a standard deviation of 3.0082, indicating relatively high variability among the sampled companies. The large difference between the minimum value (0.77) and maximum value (18.36) suggests substantial disparities in market valuation across firms.

Environmental disclosure has a mean value of 59.0744 with a standard deviation of 19.0739, indicating moderate variation in disclosure practices among companies. This finding implies that some firms provide extensive environmental information, while others still disclose environmental information at relatively low levels.

Green innovation shows a mean value of 0.7114 and a standard deviation of 0.1958, indicating relatively similar levels of green innovation activities among companies with lower variability compared to other variables.

Good Corporate Governance (GCG) has a mean value of 0.7288 and a standard deviation of 0.0982, reflecting relatively consistent governance quality across the sampled firms. The relatively narrow range between the minimum value (0.54) and maximum value (0.87) indicates that governance practices among companies tend to be homogeneous.

Overall, the descriptive statistics indicate that firm value and environmental disclosure exhibit greater variability than green innovation and GCG, which tend to be more stable across the sample.

Regression Model Selection

Chow Test

The Chow test is conducted to determine whether the Common Effect Model (CEM) or the Fixed Effect Model (FEM) is more appropriate for panel data estimation. If the probability value is less than 0.05, the Fixed Effect Model is preferred.

Table 2. Results of the Chow-Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	29.554578	(19,77)	0.0000
Cross-section Chi-square	211.537416	19	0.0000

Source: Data Processed EViews 12

Based on Table 2, the probability value of the Cross-section Chi-square is 0.0000, which is smaller than the significance level of 0.05. Therefore, the Fixed Effect Model (FEM) is considered more appropriate than the Common Effect Model (CEM). Since the Chow test indicates the use of FEM, the Hausman test is subsequently conducted to compare the Fixed Effect Model with the Random Effect Model.

Hausman Test Results

The Hausman test is used to determine whether the Fixed Effect Model (FEM) or Random Effect Model (REM) is more suitable. If the probability value exceeds 0.05, the Random Effect Model is preferred.

Table 3. Results of the Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.302807	3	0.3473

Source: Data Processed EViews 12

Based on Table 3, the probability value of the Hausman test is 0.3473, which is greater than 0.05. This result indicates that the Random Effect Model (REM) is more appropriate than the Fixed Effect Model (FEM).Because the Chow test suggests FEM while the Hausman test supports REM, an additional Lagrange Multiplier test is conducted to determine the most suitable model.

Lagrange Multiplier Test

The Lagrange Multiplier test aims to determine the best model between the random effect approach and the common effect approach that should be used in panel data modeling.

Table 4. Results of the Lagrange Multiplier Test

	Cross-section	Time	Both
Breusch-Pagan	128.1862	0.164680	128.3509
	(0.0000)	(0.6849)	(0.0000)

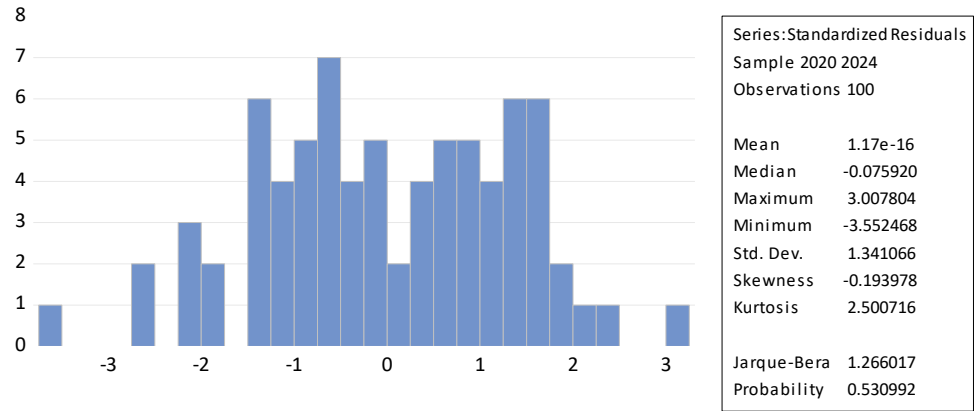
Sumber: Olah Data EViews 12

Based on Table 4, the probability value of the Cross-section Breusch-Pagan test is 0.0000, which is less than 0.05. This result indicates that the Random Effect Model (REM) is more appropriate than the Common Effect Model (CEM).Considering the results of the Chow test, Hausman test, and Lagrange Multiplier test, the Random Effect Model (REM) is selected as the most appropriate model for this study. Therefore, all further analyses are conducted using REM.

Classic Assumption Test

Normality Test

The Normality Test is used to determine whether the data is normally distributed or not. The criteria for the normal distribution test are that if the Jarque-Bera value and probability > α (0.05), then the data is assumed to be normally distributed.



Source: Data Processed EViews 12

Figure 2. Normality Test

Based on Figure 2, the Jarque-Bera Probability value obtained is 1.266017, with a probability of 0.530992. The test results show that the Probability value > α. (0.05). Therefore, it can be concluded that the data is normally distributed, so the data is considered to meet the assumption of normal distribution and is suitable for conducting a panel regression test.

Multicollinearity Test

The multicollinearity test is used to examine the relationship between independent variables. The test criteria assume that multicollinearity does not occur if the centered VIF value < 10.

Table 5. Results of the Multicollinearity Test

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
Environmental Disclosure	5.16E-06	2.063482	1.261077
Green Innovation	0.051382	2.385247	1.226996
GCG	0.882523	5.206754	1.031442

Source: Data Processed EViews 12

Based on Table 5, the results of the multicollinearity test obtained VIF values for the environmental disclosure (X1) of 1.261077, green innovation (X2) of 1.226996, and GCG (M) of 1.031442. All independent variables have values less than 10, according to these values, which indicates that the assumption of no multicollinearity is met in this study.

Heteroscedasticity Test

The Heteroskedasticity Test is used to assess the goodness of fit of the regression model. This study employs the Glejser test with residuals as the dependent variable, and if the significance score is more than 5% (0.05), then heteroskedasticity is not found.

Table 6. Heteroscedasticity Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Environmental Disclosure	-0.023511	0.012056	-1.950226	0.0541
Green Innovation	-0.568684	1.199816	-0.473976	0.6366
GCG	10.20048	5.946939	1.715248	0.0895

Source: Data Processed Eviews 12

Based on Table 6, each variable, namely the environmental disclosure (X1) obtained a probability value of 0.0541, the green innovation (X2) 0.6366 and the GCG (M) 0.0895. The probability values indicate that all variables have values greater than the significance level of 0.05. There is a possibility that this data does not show signs of heteroscedasticity.

Autocorrelation Test

The Autocorrelation test is used to see if there is a correlation between the observed data, which means the appearance of one data point is influenced by other data points. This research uses the Durbin-Watson test for autocorrelation, with the criteria that if dL < DW < 4-dU, then there is no sign of autocorrelation.

Table 7. Results of the Autocorrelation Test

Durbin-Watson stat	1.962272

Source: Data Processed EViews 12

Based on Table 7, the Durbin-Watson value obtained is 1.615250, and the values obtained are dL = 1.6131, dU = 1.7364, and 4-dU = 2.2636. Using the test criteria, we obtain dL < DW < 4-dU, which is 1.6131 < 1.9622 < 2.2636. Therefore, it can be concluded that the assumption of no autocorrelation is met in this research.

Panel Regression Analysis

Panel regression analysis is used to analyze regression over a specific period. This analysis is used to determine the environmental disclosure (X1), the green innovation (X2), and the GCG (M).

Table 8. Random Effect Panel Regression Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ED (X1)	-0.006167	0.001929	-3.197618	0.0019
GI (X2)	0.190045	0.191901	0.990327	0.3245
GCG (M)	2.278791	0.867176	2.627830	0.0100

Source: Data Processed EViews 12

Here is the regression equation based on table 8:

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_4 M + e$

$FV = -0.9276 - 0.0061\ ED + 0.1900\ GI + 2.2787\ GCG + e$

Based on the panel regression equation, it is concluded:

The coefficient value with the dependent variable of firm value (Y) is – 0.9276, meaning that if the assumptions of the environmental disclosure (X1), the green innovation (X2) and the GCG (M) are zero, the value of firm value would be – 0.9276. The environmental disclosure (X1) has a coefficient value of -0.0061, which means that if the environmental disclosure increases by 1% with the assumption that the green innovation and the GCG are all zero, it will decrease firm value by -0.0061. The green innovation (X2) has a coefficient value of 0.1900. Which means that if the green innovation increases by 1% with the assumption that the environmental disclosure and the GCG (M) are zero, it will increase firm value by 0.1900. The variable of the GCG (M) has a coefficient of 2.2787. If the GCG increases by 1% and it is assumed that the values of other variables are zero, it will decrease firm value 2.2787.

Hypothesis Testing

Simultaneous Testing (Uji F)

The F test, commonly referred to as the simultaneous test, is used to observe the influence of independent variables on the dependent variable collectively. The criterion for the F test is that if the significance value is < 0.05, then the independent variables simultaneously have a significant effect.

Table 9. F-Test Results

F-statistic	4.944466
Prob(F-statistic)	0.003096

Source: Data Processed EViews 12

Based on table 9, the F-statistic value obtained is 4.944466 and the probability is 0.003096. With the test criteria F-statistic > F-table, which is 4.944466 > 3.091, and probability < alpha (5%), which is 0.003096 < 0.05. These results prove that the environmental disclosure (X1), the green innovation (X2) and the GCG (M) have a significant simultaneous effect on firm value in company listed on the Indonesia Stock Exchange**.**

Partial Hypothesis Testing (T-test) and *Moderated Regression Analysis* (MRA)

If a probability of < 0.05 is produced, it will be stated that there is a significant implication from the independent variable to the dependent variable. If a probability of > 0.05 is produced, it is said that there will not be a significant effect.

Tabel 10. T-Test Result and MRA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.006167	0.001929	-3.197618	0.0019
X2	0.190045	0.191901	0.990327	0.3245
X1→M	0.198093	0.305689	0.648022	0.5185
X2→M	-0.009687	0.003134	-3.090858	0.0026
M	2.278791	0.867176	2.627830	0.0100

Source: Data Processed EViews 12

Based on Table 10, environmental disclosure (X1) has a probability value of 0.0019, which is less than 0.05. This indicates that environmental disclosure has a significant negative effect on firm value, as reflected by its coefficient (-0.006167). Therefore, H1 is accepted.

Green innovation (X2) shows a probability value of 0.3245, which is greater than 0.05. This indicates that green innovation does not have a significant effect on firm value, despite having a positive coefficient (0.190045). Thus, H2 is rejected.

Regarding the moderating effects, the interaction between environmental disclosure and GCG (X1×M) has a probability value of 0.5185 (> 0.05), indicating that GCG does not moderate the relationship between environmental disclosure and firm value. Therefore, H3 is rejected. In contrast, the interaction between green innovation and GCG (X2×M) has a probability value of 0.0026 (< 0.05) with a negative coefficient (-0.009687). This indicates that GCG significantly moderates the relationship between green innovation and firm value. Thus, H4 is accepted. Finally, GCG (M) has a probability value of 0.0100 (< 0.05) with a positive coefficient (2.278791), indicating that GCG has a significant positive effect on firm value. Therefore, H5 is accepted.

Test of the Coefficient of Determination (R^2)

The value of the coefficient of determination (R^2) is used to explain the contribution or the extent of the influence exerted by the independent variable on the dependent variable.

Table 11. Results of the Coefficient of Determination Test (R^2)

R-squared	0.133835
Adjusted R-squared	0.106767

Source: Data Processed EViews 12

Based on Table 11, an R-squared score of 0.133835 was obtained. This means that the contribution of the independent variables of the environmental disclosure (X1), the green innovation (X2) and the GCG (M) to firm value (Y) is 13.38% and the remaining 86.62% is influenced by other variables outside this study.

Discussion

The Influence of Environmental Disclosure on Firm Value

The results of this study indicate that environmental disclosure has a negative effect on firm value. This finding suggests that companies with higher levels of environmental disclosure tend to experience lower market valuation. The result contradicts the expectations of legitimacy theory, which argues that companies engaging in broader environmental disclosure should gain greater social legitimacy, improve corporate reputation, and strengthen stakeholder trust, ultimately leading to higher firm value (Mio et al., 2020; Balluchi et al., 2021). Previous studies such as Aboud and Diab (2018), Li et al. (2018), and Abdi et al. (2022) also found that sustainability disclosure positively affects firm value because investors perceive environmental transparency as a positive signal of corporate responsibility, risk management capability, and long-term sustainability orientation. However, the findings of this study reveal a different phenomenon in the Indonesian property and real estate sector.

One possible explanation is that investors in emerging markets such as Indonesia still prioritize short-term financial performance rather than long-term sustainability performance. Environmental disclosure may be interpreted not as an opportunity for future growth, but rather as a signal of increasing operational costs, environmental compliance burdens, and additional expenditures related to sustainability implementation (Yao et al., 2019). In the property and real estate sector, environmental initiatives often require significant investments in environmentally friendly infrastructure, green buildings, waste management systems, and energy-efficient technologies, which may reduce short-term profitability and cash flow. Consequently, investors may react negatively because they are more sensitive to immediate financial outcomes than to long-term sustainability benefits.

This finding also reflects that sustainability disclosure practices in developing countries may not yet be fully integrated into investment decision-making processes. Although ESG and sustainability reporting have become increasingly important globally (Kim & Yang, 2026; Kallisia et al., 2025), many investors in emerging markets still focus primarily on profitability, liquidity, and short-term returns. In addition, the quality and credibility of environmental disclosure may still vary significantly across companies. Sustainability reporting in emerging markets is often perceived as symbolic compliance or image-building activity rather than substantive environmental commitment (Melinda & Wardhani, 2020; Balluchi et al., 2021). This condition is closely related to signaling theory, which explains that signals only generate positive market responses when they are perceived as credible and capable of reducing information asymmetry.

The findings further support the argument of Wu and Li (2023) and Doan and Sassen (2020), who emphasized that the effectiveness of environmental disclosure depends heavily on the quality of reporting, institutional conditions, and investor perceptions. Investors may suspect that some companies engage in greenwashing practices or disclose environmental information merely to comply with regulations without implementing substantive sustainability improvements. Consequently, environmental disclosure may fail to enhance investor confidence and instead create concerns regarding additional sustainability costs and operational inefficiency.

This study therefore indicates that the effectiveness of environmental disclosure in increasing firm value depends not only on the quantity of disclosure but also on the credibility, consistency, and strategic integration of sustainability practices within the company. Companies need to ensure that environmental disclosure reflects actual environmental performance and long-term sustainability commitment rather than merely symbolic reporting activities. In this context, the findings support Li et al. (2018) and Sumarno et al. (2023), which suggest that market responses to sustainability disclosure are highly influenced by investor perceptions regarding the balance between sustainability benefits and associated economic costs.

The Influence of Green Innovation on Firm Value

The findings reveal that green innovation does not have a significant effect on firm value. This result indicates that environmentally oriented innovation activities undertaken by companies are not yet fully appreciated by the market. The finding is consistent with Husnaini and Tjahjadi (2021) and Damas et al. (2021), which also found that green innovation does not significantly influence firm value in developing-country contexts.

From the perspective of stakeholder theory, green innovation is expected to improve firm value because it reflects the company's commitment to sustainability, environmental responsibility, and responsiveness to stakeholder expectations (Li et al., 2020; El-Kassar & Kumar, 2019). Companies implementing green innovation are generally expected to improve operational efficiency, strengthen corporate reputation, reduce environmental risks, and create long-term competitive advantages (Agustia et al., 2019; Liu, 2024). However, the findings of this study suggest that such benefits may not yet be directly reflected in market valuation.

One possible explanation is that green innovation requires substantial investment costs, long development periods, technological adaptation, and uncertain financial returns. In the short term, investors may perceive green innovation as an additional financial burden rather than a strategic investment capable of generating future economic value. This condition is particularly relevant in emerging markets where investors tend to have shorter investment horizons and place greater emphasis on immediate financial performance. As a result, the market may not directly reward companies engaging in green innovation activities because the economic benefits are considered uncertain and long-term in nature.

Another explanation relates to the structural limitations faced by developing countries in implementing sustainability-oriented innovation. Green innovation implementation may still encounter obstacles such as limited technological capability, inadequate regulatory support, lack of green financing, and relatively low market demand for environmentally friendly products and services. Consequently, companies may face difficulties in converting innovation activities into measurable financial performance and market competitiveness. This finding is consistent with Xie et al. (2022), who argued that the impact of green innovation on firm value may become insignificant when innovation costs and uncertainty outweigh perceived economic benefits.

The findings also indicate that legitimacy derived from sustainability-oriented innovation may not automatically translate into higher firm value. Investors may require stronger evidence that green innovation contributes directly to profitability, efficiency, and business growth before positively valuing such activities. In addition, sustainability-oriented innovation may still be considered a secondary strategic issue compared to core financial performance in the Indonesian capital market. Therefore, although green innovation may strengthen long-term sustainability and environmental performance, its immediate impact on firm value remains limited within the context of this study.

The Influence of Environmental Disclosure on Firm Value Moderated by Good Corporate Governance

The results indicate that Good Corporate Governance (GCG) does not moderate the relationship between environmental disclosure and firm value. This finding suggests that governance quality is insufficient to strengthen investor responses toward environmental disclosure. The result contradicts signaling theory, which explains that governance mechanisms should improve the credibility of sustainability disclosure through stronger transparency, accountability, and monitoring systems (Fatma & Chouaibi, 2021; Kusuma & Nuswantara, 2021). Companies with strong governance practices are theoretically expected to gain higher investor trust because governance reduces information asymmetry and agency conflicts between managers and shareholders.

However, the findings of this study indicate that even when companies implement stronger governance practices, environmental disclosure still does not significantly increase firm value. One possible explanation is that investors in emerging markets may not yet consider

environmental information as a primary basis for investment decisions. Instead, investors continue to prioritize traditional financial indicators such as profitability, liquidity, leverage, and growth potential. Consequently, governance quality may not be sufficient to alter investor perceptions regarding sustainability disclosures.

Another explanation is related to the quality and consistency of sustainability reporting practices in Indonesia. Although governance mechanisms may improve reporting procedures and transparency, investors may remain skeptical regarding whether environmental disclosures reflect actual environmental performance or merely symbolic compliance. In many cases, sustainability disclosure quality still varies considerably among companies, making it difficult for investors to distinguish between substantive environmental commitment and greenwashing practices. Therefore, governance mechanisms may not fully strengthen the signaling effect of environmental disclosure on firm value.

This finding is consistent with Blesia et al. (2023), which reported that governance mechanisms do not significantly strengthen the relationship between environmental disclosure and firm value. The result also supports the argument of Melinda and Wardhani (2020) that the effectiveness of governance in sustainability reporting depends not only on internal governance quality but also on broader institutional factors such as investor awareness, reporting standards, market maturity, and regulatory enforcement. Thus, although GCG improves corporate accountability and transparency, its moderating role may remain limited when environmental disclosure itself is not yet highly valued by investors.

The Influence of Green Innovation on Firm Value Moderated by Good Corporate Governance

In contrast, the results show that Good Corporate Governance significantly moderates the relationship between green innovation and firm value. This finding indicates that governance quality plays an important role in enhancing the effectiveness of green innovation strategies in increasing firm value. The result supports stakeholder theory, which emphasizes that companies must align strategic decisions with stakeholder expectations in order to achieve long-term sustainability and organizational legitimacy.

Strong governance mechanisms improve managerial oversight, strategic decision-making quality, and resource allocation efficiency, thereby increasing the likelihood that green innovation initiatives are implemented effectively and generate long-term economic value. From the perspective of signaling theory, green innovation supported by strong governance sends a more credible signal to investors regarding the company's long-term commitment to sustainability, innovation capability, and risk management quality. Investors may perceive firms with stronger governance quality as more capable of managing innovation risks, utilizing resources efficiently, and converting sustainability investments into future economic benefits.

This finding also indicates that governance quality can reduce investor uncertainty regarding the outcomes of innovation activities. Green innovation often involves high implementation costs, technological uncertainty, and long-term investment horizons. However, effective governance mechanisms provide assurance that these investments are managed responsibly, transparently, and consistently with corporate objectives. As a result, governance strengthens investor confidence in the strategic value of green innovation and improves market responses toward sustainability-oriented innovation activities.

The findings are consistent with Samhadi et al. (2024), Aprilya and Marrung (2025), and Permatasari and Widianingsih (2020), which emphasize the important role of governance mechanisms in supporting the successful implementation of sustainability strategies and improving firm value. This result also confirms that governance quality functions not only as a monitoring mechanism but also as a strategic factor capable of increasing the credibility and effectiveness of sustainability-oriented innovation.

The Influence of Good Corporate Governance on Firm Value

The results indicate that Good Corporate Governance has a positive and significant effect on firm value. This finding suggests that companies with stronger governance mechanisms tend to achieve higher market valuation. The result supports corporate governance theory, which explains that effective governance mechanisms reduce agency conflicts between managers and shareholders, improve transparency, strengthen managerial accountability, and enhance decision-making quality (Fatma & Chouaibi, 2021; Kusuma & Nuswantara, 2021).

Strong governance also increases investor confidence because companies are perceived as more capable of managing risks, protecting shareholder interests, and ensuring efficient operational and strategic processes. In the context of emerging markets such as Indonesia, governance quality becomes particularly important because investors often face higher levels of information asymmetry, regulatory uncertainty, and weaker institutional environments. Companies implementing stronger governance practices are generally perceived as more reliable, transparent, and less risky, leading to more positive market responses and higher firm value.

This finding is consistent with previous studies conducted by Suhadak et al. (2019), Kartika (2021), Jannah and Sartika (2022), and Karina and Setiadi (2020), which demonstrate that governance quality is an important determinant of firm value and investment attractiveness. Furthermore, the findings confirm that GCG functions not only as a monitoring mechanism but also as a strategic framework that enhances corporate credibility, strengthens stakeholder trust, and supports sustainable corporate performance. Therefore, improving governance quality becomes essential for companies seeking to increase investor confidence and maximize long-term firm value.

5. Conclusion

Based on the results and discussion, this study concludes that environmental disclosure, green innovation, and Good Corporate Governance (GCG) simultaneously influence firm value in property and real estate companies listed on the Indonesia Stock Exchange during 2020–2024. Partially, environmental disclosure negatively affects firm value, indicating that investors in emerging markets may still perceive sustainability disclosure as a potential source of additional costs and operational burdens rather than as a strategic investment that generates long-term benefits. Meanwhile, green innovation does not significantly affect firm value, suggesting that environmentally oriented innovation activities have not yet been fully appreciated by the market. In contrast, GCG positively affects firm value and also strengthens the relationship between green innovation and firm value, indicating that strong governance mechanisms can enhance the credibility and effectiveness of sustainability-oriented innovation strategies. However, GCG is unable to strengthen the relationship between environmental disclosure and firm value, implying that governance quality alone may not be sufficient to change investor perceptions toward sustainability disclosure in emerging markets.

The findings of this study contribute theoretically to legitimacy theory, signaling theory, stakeholder theory, and corporate governance theory. The negative effect of environmental disclosure extends signaling theory by showing that sustainability disclosure is not always interpreted positively by investors, particularly when the disclosure is perceived as symbolic or associated with additional costs. Furthermore, the significant moderating role of GCG in the relationship between green innovation and firm value supports stakeholder theory and corporate governance theory, emphasizing the importance of governance quality in improving investor confidence and strengthening the implementation of sustainability strategies. Practically, this study suggests that companies should not only increase the quantity of sustainability disclosure but also improve the quality, credibility, and strategic integration of sustainability practices into long-term business objectives. Strengthening governance

mechanisms such as transparency, accountability, and managerial oversight is also important to improve investor trust and market responses toward sustainability initiatives.

This study has several limitations. First, the research sample is limited to property and real estate companies, which may reduce the generalizability of the findings to other industrial sectors. Second, firm value may also be influenced by other factors not included in this study, such as profitability, leverage, firm size, financial performance, and macroeconomic conditions. Third, the use of secondary data from annual and sustainability reports may create potential reporting bias because the disclosed information depends on managerial disclosure policies and reporting quality. Therefore, future studies are recommended to expand the research sample across various sectors and observation periods to improve the generalizability of the findings. Future research may also include additional variables such as ESG performance, profitability, institutional ownership, or financial performance indicators to improve the explanatory power of the model. In addition, future researchers are encouraged to use alternative sustainability measurement approaches, such as ESG ratings or external sustainability databases, to obtain more objective and comprehensive assessments of corporate sustainability practices.

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