

THE MODERATING ROLE OF CEO OVERCONFIDENCE IN THE EFFECT OF GREEN INNOVATION ON FIRM VALUE

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ABSTRAK

Penelitian ini menguji pengaruh inovasi hijau terhadap nilai perusahaan serta menganalisis apakah CEO overconfidence memoderasi hubungan tersebut. Sampel penelitian terdiri atas 346 perusahaan non-keuangan yang terdaftar di Bursa Efek Indonesia periode 2019–2023, dengan total 1.730 observasi *firm-year* melalui *purposive sampling*. Analisis data dilakukan menggunakan *generalized least squares* (GLS) untuk mengatasi potensi heteroskedastisitas dan autokorelasi pada data panel. Hasil pengujian menunjukkan bahwa inovasi hijau berpengaruh positif terhadap nilai perusahaan. Namun, CEO overconfidence tidak memoderasi hubungan antara inovasi hijau dan nilai perusahaan. Temuan ini mengindikasikan bahwa peningkatan nilai perusahaan melalui inovasi hijau lebih didorong oleh inisiatif strategis pada tingkat perusahaan dibandingkan oleh karakteristik psikologis eksekutif puncak. Penelitian ini berkontribusi pada literatur mengenai inovasi berkelanjutan dan tata kelola perusahaan berbasis perilaku dengan menyediakan bukti empiris dari konteks pasar negara berkembang.

Kata Kunci: CEO overconfidence, inovasi hijau, nilai perusahaan, teori upper echelon

ABSTRACT

This study examines the effect of green innovation on firm value and investigates whether CEO overconfidence moderates this relationship. The sample consists of 346 non-financial firms listed on the Indonesia Stock Exchange covering the period 2019–2023, yielding 1,730 firm-year observations selected through purposive sampling. The data were analyzed using generalized least squares (GLS) to address potential heteroskedasticity and autocorrelation in the panel data. The findings reveal that green innovation has a positive and significant impact on firm value. However, CEO overconfidence does not moderate the relationship between them. The results suggest that the value-enhancing effect of green innovation is primarily driven by firm-level strategic initiatives rather than the psychological traits of top executives. The study contributes to the literature on sustainable innovation and behavioral corporate governance by providing evidence from an emerging market context.

Keywords: CEO overconfidence, green innovation, firm value, upper echelon theory

1. Introduction

Green innovation has expanded vertically and horizontally across all levels, from small microenterprises to the national macro scale, significantly influencing the green development of firms worldwide (Zhang et al., 2020). Increasingly stringent environmental policy regulations also encourage the development of such innovation (Liu, 2024). This development has prompted firms to pursue green innovations in their businesses, such as the production of environmentally friendly products (Husnaini & Tjahjadi, 2021). Green innovation is key to reducing environmental damage and ensuring the sustainable development of firms' economic activities (Xie et al., 2022). This is what encourages many firms to start paying attention to policies related to green innovation. Adopting such an approach can create a positive image and a good societal reputation (Shao et al., 2025).

This phenomenon can be seen in Indonesia. The obligation to report sustainability as a means of communication, and the firm's responsibilities related to the sustainability of its business environment, must be reported in accordance with the Financial Services Authority Regulation (POJK) Number 51/2017, clarified by OJK Circular Letter (SEOJK) No. 16/2021. This shows the commitment of the firm and the state to maintaining sustainability, both in the economy, society and the environment, for the sake of future sustainability. If undertaken regularly, green innovation can be the key to achieving firms' goals, increasing firm value, and providing a competitive advantage (Hidayat et al., 2024).

There has been extensive research on how green innovation impacts firm value, although studies have yielded mixed findings. Several have found that green innovation has a positive impact on firm value (Agustia et al., 2019; Asni & Agustia, 2022; Astuti & Ahmar, 2025; Hidayat et al., 2024; Samhadi et al., 2024; Yuniarti et al., 2022). Similarly, Rizki and Hartanti (2021), using a sample of five ASEAN countries, showed that green innovation increases firm value. Dai and Xue (2022) and Zhang et al. (2020) also demonstrate that green innovation positively affects firm value, using a sample of firms in China. However, other studies show that green innovation does not influence green innovation (Asni & Agustia, 2022; Astuti & Ahmar, 2025; Samhadi et al., 2024).

Green innovation is seen as a key competitive strategy, used by managers to generate value for all stakeholders through superior products to traditional ones (Agustia et al., 2019). This phenomenon illustrates how green innovation impacts firm value. Conversely, earlier studies have also shown that green innovation may not affect firm value because it requires substantial capital investment and yields relatively low returns (Astuti & Ahmar, 2025; Samhadi et al., 2024). Therefore, there remain inconsistencies in the findings of previous research.

In light of these inconsistencies, this study suggests that other factors may influence the relationship between green innovation and firm value. The high costs associated with the significant potential require CEOs to have a high level of confidence in order to encourage green innovation and boost firm value (Fionita et al., 2022). Our research addresses the gap by exploring the extent to which CEO overconfidence influences the link between green innovation and firm value, an area still seldom studied. Such overconfidence can help align a firm's investment level with the optimal point, leading to better performance (Mundi & Kaur, 2019).

This study examines a sample of firms listed on the Indonesia Stock Exchange. Indonesia, a developing country in Southeast Asia, faces growing challenges to enhancing sustainability across economic, social and environmental dimensions. Addressing these issues has become a key focus within the Sustainable Development Goals in Southeast Asia, particularly through ASEAN (Asni & Agustia, 2022). Policies from the Indonesian government related to the country's contribution to supporting this sustainability development plan have been prepared and determined for firms listed on the Indonesian Stock Exchange. In Indonesia, environmental assessment performance can be evaluated through the Corporate Performance Rating Assessment (PROPER) (Yuniarti et al., 2022), a program developed by the Ministry of Environment and Forestry.

The study aims to evaluate how green innovation impacts firm value and to examine how CEO overconfidence affects the relationship between them. The research is driven by the growing strategic significance of green innovation in boosting company competitiveness and creating long-term value, especially in emerging markets. While previous research has highlighted the economic impact of sustainability efforts, evidence on how green innovation affects firm value remains unclear and varies according to the context studied. Additionally, the influence of managerial traits, particularly CEO overconfidence related to strategic investments, has been widely studied in corporate governance, but how it moderates green innovation outcomes remains less explored. This is significant, since green innovation often involves high levels of uncertainty, long-term investments, and significant resource use, areas in which managerial biases could play a role. The study investigates whether the impact of green innovation on firm value depends on CEO overconfidence and offers timely insights into whether sustainable growth is mainly driven by organizational capabilities or individual traits. It also refines understanding of upper echelon theory in sustainability strategies, supported by data from an emerging market.

The study makes several important contributions. First, from a theoretical perspective, it extends the literature on green innovation and firm value by integrating insights from the resource-based view and upper echelon theory. While previous studies have largely examined the direct economic consequences of sustainability initiatives, our research advances the debate by empirically testing whether the value relevance of green innovation is contingent upon CEO overconfidence. By doing so, it clarifies the boundary conditions of managerial influence in sustainability-driven strategies and provides evidence on whether organizational capabilities or executive traits play a more decisive role in value creation.

Second, from a practical standpoint, the findings provide managerial implications for corporate leaders and boards of directors. The results suggest that firms should institutionalize green innovation through structured governance mechanisms, long-term strategic alignment, and sustainability-oriented performance metrics, rather than relying on individual CEO characteristics. This highlights the importance of building organizational systems and cultures that consistently support sustainable innovation to enhance firm value.

Third, from a policy perspective, empirical support is provided for regulatory initiatives that promote green innovation as a value-enhancing corporate strategy. By

demonstrating that green innovation positively contributes to firm value regardless of CEO overconfidence, the findings justify policy interventions such as sustainability disclosure requirements, green investment incentives, and governance guidelines, which encourage firms to adopt systematic, accountable sustainability practices. Therefore, companies should build governance systems, organizational structures, and corporate cultures that formally support green innovation, including the integration of sustainability targets into corporate strategies and the implementation of ESG performance-based managerial incentive systems. At the regulatory level, the study results provide an empirical basis for strengthening fiscal incentive policies, sustainability reporting standards, and sustainable governance frameworks to create an ecosystem that encourages investment in environmentally friendly technologies and processes.

2. Theoretical Framework and Hypothesis Development

The study employs signal theory as its foundational framework. Based on the theory, green innovation can often be considered to be a firm's effort to present a positive outlook and signal to investors (Hidayat et al., 2024). The related green innovation statement can serve as a signal to interested parties, such as investors, when they make investment decisions (Zhang et al., 2020). Asni and Agustia (2022) state that green innovation can be a positive signal in the capital market and attract investors' attention to firms implementing such initiatives. A high firm value can also boost a CEO's confidence in their firm (Fionita et al., 2022). This can further reinforce their biased perspectives and influence their firm's operations. Investors often view an increase in firm value as a sign of effective resource management and of the firm's long-term growth potential (Astuti & Ahmar, 2025). Firm value is a fundamental concept because it has implications for investment (Shah et al., 2018); therefore, firms must also pay attention to and strive to create it in various ways, including through green innovation.

CEO overconfidence influences a firm's value and investments (Cho et al., 2021). It can be explained by upper echelon theory, which suggests that the personal traits of top managers, such as excessive self-confidence, affect how they interpret strategic situations and make decisions (Hambrick & Mason, 1984). Such overconfidence tends to be high-risk and long-term, which can drive investment in green innovation as a means of differentiation and sustainability strategy. Upper echelon theory contends that a firm's leadership characteristics can influence decisions about the firm, which ultimately impacts its performance (Shen, 2021). CEOs' decisions will be significantly influenced by the personal characteristics inherent in their individual personalities (Ting et al., 2015). However, a CEO's high self-confidence tends to prevent them from considering suggestions regarding decision-making (Kraft et al., 2025). A CEO's personality is closely related to the decisions they make and affects firm value (Tang et al., 2020). Investors should therefore consider such personality traits to reduce risk in their investment decisions (Gao & Han, 2020).

Furthermore, according to the resource-based view (Barney et al., 2001), green innovation can provide a sustainable competitive advantage if a firm effectively manages its internal resources and capabilities. CEO overconfidence can accelerate the development of these innovative capabilities by encouraging the exploration of new technologies and

strategies, thereby positively impacting firm value, provided such initiatives are supported by adequate governance and risk evaluation. Therefore, CEO overconfidence is expected to strengthen the positive relationship between green innovation and firm value.

2.1. Green Innovation and Firm Value

Green innovation refers to the type of innovation a firm pursues to reduce negative environmental impacts, while positively affecting the environment (Asni & Agustia, 2022). Many large firms are becoming involved and committing to more environmentally friendly products (Yao et al., 2019). Green innovation is a key intangible asset that can influence a firm's value (Xie et al., 2022); it can not only provide economic benefits, but also provide competitive advantages (Agustia et al., 2019). Increasing green innovation will raise a firm's value (Shao et al., 2025). Stakeholders will give more importance to firms that can meet expectations and overcome problems to build their trust (Mahmood et al., 2025). This can encourage green innovation as a tool for firms to increase their value to investors.

According to the findings of several previous studies, green innovation has a positive influence on firm value (Agustia et al., 2019; Asni & Agustia, 2022; Astuti & Ahmar, 2025; Hidayat et al., 2024; Samhadi et al., 2024; Yuniarti et al., 2022; Rizki & Hartanti, 2021; Dai & Xue, 2022; Zhang et al., 2020). It positively correlates with firm value because creating eco-friendly products, processes and technologies can enhance operational efficiency, cut long-term costs, and boost the firm's reputation and competitiveness in a market that values sustainability. Nonetheless, some studies indicate the contrary, showing that green innovation may not necessarily impact firm value (Asni & Agustia, 2022; Astuti & Ahmar, 2025; Samhadi et al., 2024). This indicates that there are still differences in the findings of previous studies. Based on the literature review, the first hypothesis proposed is that:

H₁: Green innovation is related to firm value.

2.2. Moderating Role of CEO Overconfidence

The inconsistency in previous research findings on the impact of green innovation on firm value suggests that other factors may influence the relationship. One notable characteristic of CEOs is their overconfidence, which significantly affects various strategic decisions within the organization (Tang et al., 2020). Overconfident CEOs are highly motivated to seek recognition and are driven to establish a positive image and reputation for their firm (Wang et al., 2023). Green innovation is one way firms can create a positive image (Hidayat et al., 2024); innovations developed can serve as a tool to enhance the firm's appeal to investors (Xie et al., 2022). The characteristics of a CEO's overconfidence can be related to the firm's social activities (Park et al., 2020). Such overconfidence can also optimize the firm's investment level and produce superior performance (Mundi & Kaur, 2019). CEOs who have high levels of trust are generally more willing to take bold actions, even if they are costly, to drive innovation and enhance their firm's value (Fionita et al., 2022).

Overconfidence occurs when individuals exaggerate their abilities and knowledge of certain situations (Wang et al., 2023) and underestimate the risks involved (Listiani et al., 2024; McCarthy et al., 2017). CEO confidence can be strengthened when the firm's performance is high (Fionita et al., 2022). Those that disclose extensive environmental information can influence their reputation among investors, leading to increased

overconfidence in a CEO (Lee, 2021). On the other hand, CEOs with less confidence are less able to maximize firm value (Cho et al., 2021).

Therefore, CEO overconfidence can influence the relationship between green innovation and firm value. Excessive self confidence in a CEO's traits can lead to riskier investment decisions, including those related to environmentally-focused projects that involve high costs and uncertain outcomes. However, such an optimistic attitude can be a positive force in driving green innovation, as CEOs are willing to explore new technologies and sustainable strategies that could improve efficiency and enhance the firm's reputation. However, when overconfidence is not balanced with rational judgment, it can lead to misallocation of resources and project failure, ultimately reducing the firm's value. Based on this discussion, it is hypothesized that:

H2: CEO overconfidence affects the relationship between green innovation and firm value.

Figure 1 illustrates the conceptual framework of the study and provides a schematic representation of the relationships between the variables examined. The analysis also incorporates several control variables, including return on assets, firm size, leverage, loss, firm age and the market-to-book ratio. These variables are included to capture firm-specific characteristics that may affect firm value, thereby enhancing the reliability and robustness of the estimated relationships.

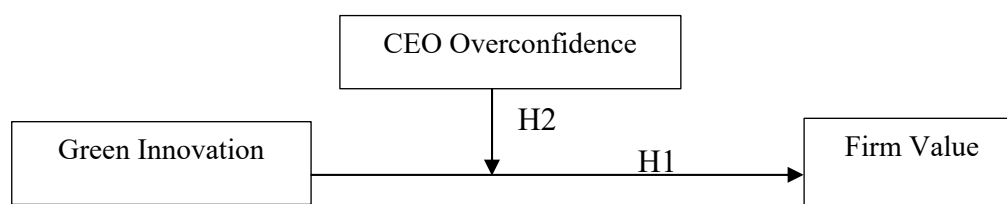


Figure 1. Research Framework

3. Research Method

3.1. Data and Sample

The study is based on secondary data obtained from audited annual reports and firms' financial statements published on their respective official websites. The population consisted of non-financial companies listed on the Indonesia Stock Exchange during the 2019–2023 period. This period is considered relevant because it reflects a phase of increasing environmental awareness, supported by regulatory initiatives that encouraged listed firms to engage in sustainability reporting. To determine the research sample, a purposive sampling approach was employed based on predefined criteria.

Firms were excluded from the sample if they did not consistently disclose annual reports and audited financial statements; if their fiscal year did not end on December 31; or if their financial statements were not denominated in Indonesian rupiahs. In addition, firms with no reported sales were removed from the dataset because they may have generated extreme values that could have biased the results. After applying these screening criteria, 346 firms remained eligible for the analysis, producing a total of 1,730 firm-year observations. The distribution of the final sample is presented in Table 1. Data from 2018 were also incorporated because several variables required information from the preceding year.

Table 1. Sampling Criteria Results

Sample Criterion	Number of Firms	Total Data
Non-financial firms consistently listed on the Indonesia Stock Exchange from 2018 to 2023.	467	2,802
Companies that inconsistently published complete annual and financial reports during the observation period.	(39)	(234)
Companies that did not consistently disclose financial reports ending on December 31.	(5)	(30)
Companies that did not consistently use the IDR currency in financial reports.	(77)	(462)
Number of research samples	346	2,076

Source: Data Processing Results (2025)

3.2. Operationalization of Variables

The Chow test was employed to evaluate the suitability of the pooled OLS model relative to the fixed-effects model. In addition, the Breusch–Pagan Lagrange Multiplier (LM) test was used to examine whether panel effects existed relative to the pooled OLS specification, while the Hausman test was conducted to identify the more appropriate model between the fixed effects and random effects approaches. The findings reveal that both the Chow and LM tests rejected the pooled OLS model, indicating the existence of unobserved heterogeneity among firms. Moreover, the Hausman test produced a statistically significant outcome, suggesting that the fixed effects model was more appropriate than the random effects model because the unobserved individual effects were correlated with the explanatory variables. Therefore, the fixed effects estimator was adopted as the primary model specification. Data analysis was conducted with STATA software. The regression model equation used in the study is given below:

$$Tobin'sQ_{it} = \alpha_0 + \beta_1 GI_{it} + \beta_2 OVER_{it} + \beta_3 GI*OVER_{it} + \sum_{i=6}^n \beta_i Controls_{it} + e_{it} \dots (1)$$

where:

Tobin's Q	= Firm Value
GI	= Green Innovation
OVER	= CEO Overconfidence
ROA	= Return on Assets
SIZE	= Firm Size
LEV	= Leverage
LOSS	= Loss
AGE	= Firm Age
MTB	= Market to Book

Several control variables were employed, including ROA, firm size, leverage, loss, firm age and the market-to-book ratio. The operational definitions and measurements of these variables are summarized in Table 2. A hierarchical panel regression approach was adopted to test the direct and moderating relationships proposed in the conceptual framework. Model (1) serves as the baseline specification, examining the relationship between green innovation (GI) and firm value by regressing firm value on GI together with a set of control variables. Model (2) augments the baseline model by introducing CEO

overconfidence (OVER) as an additional explanatory variable to assess its direct effect on firm value. Model (3) represents the full moderation model by incorporating the interaction term between GI and OVER (GI×OVER) to evaluate whether CEO overconfidence moderates the association between green innovation and firm value. The moderating role is determined by the interaction coefficient's statistical significance. This stepwise modeling procedure facilitates a systematic comparison of model fit and explanatory power, thereby providing a rigorous examination of both direct and conditional relationships within the proposed framework.

As a robustness test, firm value was alternatively measured using the closing stock price at the end of March in the subsequent year. This timing was considered appropriate because listed firms in Indonesia must submit their audited financial statements by the end of March of the following fiscal year. Therefore, the end-of-March closing price is expected to better reflect the market's response to the financial information disclosed during the first quarter of the subsequent year.

Table 2. Measurement of Variables

Variable	Definition	Measurement	References
TobinsQ	Firm Value	The ratio of market capitalization is measured as the number of outstanding shares multiplied by the closing share price to total assets.	(Gao & Han, 2020)
$Tobin's\ Q = \frac{Outstanding\ Share \times Closing\ Price}{Total\ Assets}$			
GI	Green Innovation	Analysis of the firm's annual report content, including the following items: 1. Reducing resource, water and energy consumption while improving their utilization efficiency. 2. Using recycled materials and applying recycling technologies or processes. 3. Conducting environmental awareness programs and community engagement activities. 4. Adopting equipment or technologies that reduce energy and water usage and waste. 5. Redesigning products to minimize pollution or the generation of toxic substances during production. 6. Developing and improving environmentally friendly packaging for both existing and new products. 7. Designing or modifying products to enhance energy efficiency during the usage phase. 8. Utilizing environmentally friendly materials that reduce environmental pollution or harm. Each indicator is assigned a value from 0 to 2 based on the following assessment criteria:	(Lestari & Soewarno, 2024)

		0= no disclosure of the indicator. 1= the indicator is disclosed with limited explanation. 2= the indicator is disclosed with a comprehensive explanation.	
OVER	CEO Overconfidence	Overinvestment is assessed using the residual of a regression of asset growth on sales growth. It also includes a control variable, profitability (ROA), to minimize potential measurement bias caused by strong firm performance. Quartiles group the residual regression results. The data in quartile three, or the 25% highest values, are assigned the value 1; otherwise, the value is 0.	(Sutrisno et al., 2022, 2023; Sutrisno & Karmudiandri, 2020)
		$\frac{\Delta Asset_{i,t}}{Asset_{i,t-1}} = \alpha_0 + \beta_1 \frac{\Delta Sales_{i,t}}{Sales_{i,t-1}} + \beta_2 ROA_t + \varepsilon$	
Control Variable:	Return on Assets ROA	The ratio of the firm's total net profit to its total assets.	(Gao & Han, 2020)
		$ROA = \frac{Net\ Income}{Total\ Assets}$	
SIZE	Firm Size	The logarithm of the firm's total assets.	(Gao & Han, 2020)
LEV	Leverage	The ratio of total liabilities divided by total assets.	(Gao & Han, 2020)
		$LEV = \frac{Total\ Liabilities}{Total\ Assets}$	
LOSS	Loss	If the firm experiences losses in the income statement, marked by a value of 1; otherwise, the value is 0.	(Sutrisno & Karmudiandri, 2020)
AGE	Firm Age	The number of years a firm has operated since its establishment.	(Lestari & Soewarno, 2024)
MTB	Market to Book	The ratio of the number of outstanding shares times the closing share price, divided by the firm's total equity.	(Sutrisno et al., 2022, 2023; Sutrisno & Karmudiandri, 2020)
		$MTB = \frac{Total\ Outstanding\ Share \times Closing\ Price}{Total\ Equity}$	

Source: Previous Research

4. Results and Discussion

4.1. Results

The study results are presented in stages, beginning with the descriptive statistics to give an overview of each variable. The classical assumption tests are also displayed to confirm that the data do not exhibit heteroscedasticity, autocorrelation or multicollinearity

issues. Additionally, the findings from the influence estimation and hypothesis testing for the research model will be discussed as the key focus.

Table 3. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
TobinsQ	1.201	1.989	.026	15.826
GI	.334	.212	0	.875
OVER	.127	.333	0	1
ROA	.028	.101	-.544	.383
SIZE	12.40	0.789	7.810	14.649
LEV	.505	.38	.04	3.388
LOSS	.314	.464	0	1
AGE	34.179	15.576	4	112
MTB	2.203	4.223	-6.186	39.828

Source: Processed data (2025)

Outliers were addressed by winsorizing at the 1st and 99th percentiles for variables such as firm value (Tobin's Q), CEO overconfidence (OVER), and control variables (ROA and leverage). Firm size (SIZE) was centered to overcome multicollinearity. As can be seen in Table 3, the descriptive statistics show an average Tobin's Q of 1.201, suggesting that the sample firms have slightly higher market values than their book values, indicating growth potential and positive investor perception. The average green innovation (GI) score is 0.334, indicating a moderate level of green innovation. The mean CEO overconfidence (OVER) score is 0.127, indicating that around 12.7% of firms exhibit this. The average ROA of 2.8% indicates low profitability. The mean firm size (SIZE) is 12.40, suggesting a moderate scale, while the average debt-to-assets ratio is 0.505, indicating that some assets are financed with debt. Around 31.4% of the firms experienced losses, reflected by a LOSS value of 0.314. The average firm age (AGE) is 34.179 years, indicating most firms are well-established. The mean MTB ratio of 2.203 suggests that the average market value is approximately twice the book value, signifying strong growth prospects.

Table 4. Multicollinearity Test

Variable	VIF	1/VIF
GI	3.69	.271
OVER	1.15	.867
ROA	1.13	.887
SIZE	1.28	.779
LEV	2.78	.360
LOSS	1.76	.569
AGE	4.12	.243
MTB	1.25	.797

Source: Processed data (2025)

The analysis employed a fixed-effects panel data model and examined several classical assumptions, including multicollinearity, heteroscedasticity and autocorrelation. Table 4 reports the results of the multicollinearity test. These indicate that multicollinearity was not a concern in the model, as all the VIF values are below 10.

Table 5 presents the correlation test results, showing that CEO overconfidence is positively and significantly associated with firm value (Tobin's Q). This suggests that such

overconfidence may boost market value through bold strategic choices. Green innovation (GI) is positively associated with firm size and age, suggesting that larger, more established firms are more engaged in sustainable innovation. Conversely, the connection between GI and firm value is weak and negative, indicating that the market may not yet fully recognize or benefit from green innovation economically in the short term. Additionally, the relationships between the other variables align with theoretical expectations. The absence of high correlations suggests no multicollinearity, supporting the robustness of the further analysis.

Table 5. Pairwise Correlation Analysis

Variable	TobinsQ	GI	OVER	ROA	SIZE	LEV	LOSS	AGE	MTB
TobinsQ	1.000								
GI	-0.057**	1.000							
OVER	0.094***	0.002	1.000						
ROA	-0.027	0.035	0.076***	1.000					
SIZE	-0.222***	0.458***	0.011	0.121***	1.000				
LEV	0.094***	-0.073***	0.020	-0.156***	-0.087***	1.000			
LOSS	-0.032	-0.222***	-0.105***	-0.246***	-0.295***	0.288***	1.000		
AGE	-0.102***	0.239***	-0.120***	0.015	0.183***	0.025	-0.088***	1.000	
MTB	0.565***	0.014	0.064***	-0.035	-0.040*	-0.023	-0.023	-0.035	1.000

***p<0.01, **p<0.05, *p<0.1

Source: Processed data (2025)

The heteroscedasticity and autocorrelation tests indicated issues with the research model, specifically heteroscedasticity ($\text{Prob} > \chi^2 = 0.000 < \alpha$) and autocorrelation ($\text{Prob} > F = 0.000 < \alpha$). This suggests data with non-constant variance and correlated residuals across periods. Therefore, addressing these issues was essential. To address the econometric issues, the generalized least squares (GLS) estimator was employed, which accommodates heteroskedasticity and autocorrelation in panel data settings. By accounting for cross-sectional heterogeneity and within-panel serial correlation, GLS produces more efficient and reliable estimates compared to conventional OLS under such conditions. Therefore, the use of GLS ensured the robustness and validity of the empirical findings.

Table 6. Estimated Results

Variable	Model 1	Model 2	Model 3
GI	0.640*** (0.006)	0.573** (0.013)	0.628*** (0.007)
OVER		0.417*** (0.000)	0.568*** (0.000)
GI*OVER			-0.465 (0.208)
ROA	0.208 (0.420)	0.0556 (0.829)	0.0755 (0.770)
SIZE	-2.936*** (0.000)	-2.976*** (0.000)	-2.947*** (0.000)
LEV	-0.515*** (0.001)	-0.625*** (0.000)	-0.620*** (0.000)
LOSS	-0.187** (0.013)	-0.182** (0.014)	-0.182** (0.015)
AGE	-0.0817*** (0.000)	-0.0751*** (0.001)	-0.0749*** (0.001)
MTB	0.166***	0.166***	0.166***

Variable	Model 1	Model 2	Model 3
	(0.000)	(0.000)	(0.000)
Constant	3.739***	3.544***	3.516***
	(0.000)	(0.000)	(0.000)
Observations	1,728	1,726	1,726
R-squared	0.324	0.331	0.332
Number of obs	346	346	346

***p<0.01, **p<0.05, *p<0.1
Source: Processed data (2025)

The R-squared value in Table 6 rose slightly, from 0.324 (Model 1) to 0.332 (Model 3), indicating that adding the moderation variable only marginally improved the model's ability to explain the variation in firm value. The regression results in Table 6 demonstrate that green innovation (GI) positively impacts firm value (Tobin's Q) across all three models, with high significance (p-value ≤ 0.01). Therefore, Hypothesis 1 is confirmed. This suggests that higher levels of green innovation activity enhance firm value, reinforcing the notion that sustainable approaches can generate long-term economic benefits.

CEO overconfidence (OVER) positively influences firm value in Models 2 and 3 (p-values ≤ 0.01), suggesting that confident CEOs can drive strategic decisions that boost market performance. However, the interaction between GI and OVER (GI*OVER) shows a negative (-0.465) and statistically insignificant coefficient (p-value > 0.05). This suggests that hypothesis 2 is not supported; CEO overconfidence does not enhance the relationship between green innovation and firm value. While individually both factors contribute positively, the moderating role of overconfidence is not statistically confirmed.

Overall, the findings indicate that green innovation and CEO overconfidence each positively influence firm value. However, their interaction has no significant effect, suggesting that the benefit of green innovation is independent of the CEO's level of overconfidence. The model demonstrates consistent and statistically significant results, supporting the conclusion that sustainability strategies and leaders' psychological traits are crucial for enhancing firm value, even if they do not strengthen each other's effects directly.

4.2. Robustness Check

A robustness test was conducted to verify the stability and reliability of the results. The test replaced the closing price data used in the Tobin's Q calculation. The original analysis used the closing price on December 31, but in this robustness check, the closing price on March 31 of the following year was utilized. This date choice ensured that the stock price had incorporated the market's response to the financial statements, which are typically released in the first quarter of the following year. As a result, Tobin's Q more accurately and meaningfully reflects firm market value and financial performance.

Table 7. Robustness Test Results

Variable	Model 1	Model 2	Model 3
GI	0.288*** (0.001)	0.275*** (0.002)	0.269*** (0.003)
OVER		0.0785** (0.011)	0.0615 (0.275)
GI*OVER			0.0524 (0.718)
ROA	0.314*** (0.002)	0.256** (0.011)	0.254** (0.012)
SIZE	-0.733*** (0.000)	-0.769*** (0.000)	-0.773*** (0.000)
LEV	-0.210*** (0.000)	-0.248*** (0.000)	-0.248*** (0.000)
LOSS	-0.0255 (0.384)	-0.0219 (0.454)	-0.0219 (0.453)
AGE	-0.0160* (0.070)	-0.0137 (0.120)	-0.0138 (0.119)
MTB	0.0252*** (0.000)	0.0250*** (0.000)	0.0250*** (0.000)
Constant	1.327*** (0.000)	1.264*** (0.000)	1.267*** (0.000)
Observations	1,728	1,726	1,726
R-squared	0.105	0.107	0.107
Number of obs	346	346	346

***p<0.01, **p<0.05, *p<0.1

Source: Processed data (2025)

As shown in Table 7, green innovation (GI) consistently positively influences firm value, measured by the closing price on March 31 of the following period (TobinsQt+1), across all three test models ($p\text{-value} \leq 0.01$). These results support the initial hypothesis, indicating that increased GI activity enhances market value, even when accounting for potential time delays in market responses. CEO overconfidence (OVER) showed a positive impact in Model 2 ($p \leq 0.05$), but this effect lost significance after interaction variables were added in Model 3. This implies that although CEO overconfidence tends to boost firm value, its effect diminishes when interactions with green innovation are considered. GI*OVER interaction was also ineffective ($p\text{-value} \geq 0.05$), reinforcing the main finding that CEO overconfidence does not influence the green innovation–firm value relationship. These findings align with the primary results of the second hypothesis.

The robustness analysis further confirms that the positive relationship between green innovation and firm value remained robust when Tobin's Q was alternatively measured using the closing stock price on March 31 of the subsequent year. This consistency strengthens the credibility of the main findings and suggests that the observed effect was not sensitive to alternative valuation measures or variations in market timing. Overall, the results indicate that the market responds favorably and consistently to firms' green innovation initiatives.

4.3. Discussion

4.3.1. The Effect of Green Innovation on Firm Value

Green innovation represents a firm's effort to demonstrate environmental responsibility. Often, it offers organizations a competitive edge (Agustia et al., 2019). Firms that actively pursue green innovations are seen as capable of adapting to market and regulatory changes, thus creating differentiation. Adopting green innovation not only indicates compliance with environmental laws, but also serves as a strategic move to boost competitiveness amid growing global sustainability consciousness (Samhadi et al., 2024). It has shifted from merely fulfilling sustainability commitments to becoming a strategic tool that enhances a firm's value within its industry. Investing in such innovation helps firms reduce costs, boost operational efficiency, and expand their market share (Liu, 2024).

The findings related to the first hypothesis show that green innovation positively affects firm value. Our results are consistent with those of previous studies (Agustia et al., 2019; Asni & Agustia, 2022; Astuti & Ahmar, 2025; Hidayat et al., 2024; Samhadi et al., 2024; Yuniarti et al., 2022; Rizki & Hartanti, 2021; Dai & Xue, 2022; Zhang et al., 2020). Green innovation is often seen as a sign that firms committed to developing and implementing environmentally friendly innovations are dedicated to the sustainability of their business. The notion that green innovation influences firm value is based on signal theory. Such commitment can attract investors and boost the firm's worth. Investors tend to give higher ratings to firms that show environmental concern through green innovation (Agustia et al., 2019). The study findings support signal theory, suggesting that firms' reporting and presentation of green innovations serve as a positive signal for investors, attracting them and subsequently enhancing firms' value. As green innovations become increasingly developed and implemented, they are expected to further boost the overall firm value.

The preliminary findings of the study support signal theory, suggesting that green innovations implemented by firms can signal their commitment to sustainability and potentially enhance their value in the eyes of investors. Such innovations offer environmental and economic benefits by boosting the firm's attractiveness to investors, who may consider green innovation a key factor when evaluating a firm's overall profile. This positive signal from green innovation policies can serve as a tool for investors to assess whether a firm is genuinely concerned about its business environment, directly or indirectly.

4.3.2. The Effect of CEO Overconfidence on the Relationship Between Green Innovation and Firm Value

Other factors, such as CEO overconfidence, also affect how green innovation is implemented and its impact on firm value. A overconfident CEO may be more inclined to pursue green innovation, believing it can be a strategic tool to boost the firm's success. CEO overconfidence is seen to encourage firms to continue developing and adopting green innovations, as such leaders believe that green innovation can enhance their business growth and competitiveness (Fionita et al., 2022). This overconfidence in CEOs is linked to the upper echelon theory, which suggests that CEO traits can shape strategic choices. An optimistic CEO may speed up green innovation efforts, believing in the long-term benefits of such policies. However, overconfidence may also introduce bias, leading to decisions

that rely more on personal beliefs than on objective data. If these expectations are not met, the firm could suffer from the decisions that result (Cho et al., 2021).

However, the findings related to the second hypothesis indicate that CEO overconfidence does not influence the relationship between green innovation and firm value. The bias in CEO confidence has no effect, as confidence does not necessarily lead to better performance decisions (Fionita et al., 2022). Neither does excessive CEO confidence affect green innovation policies which could raise firm value. CEOs may think that adopting green innovation will not necessarily improve their firm's performance. Overconfidence can bias a CEO's decisions, leading them to overlook risks to the firm (McCarthy et al., 2017). This divided perspective might lead CEOs to focus on other priorities, rather than the implementation of green innovation which could boost the firm's value in investors' eyes.

5. Conclusion, Implications and Limitations

The study has investigated how green innovation disclosure impacts firm value and examines whether CEO overconfidence influences this relationship. The results indicate that green innovation positively affects firm value by serving as a favorable signal to investors, enhancing their perception of the firm, and potentially increasing its value. This aligns with the theory that green innovation can guide investor valuation and decision-making. Conversely, CEO overconfidence does not appear to modify the link between green innovation and firm value, although it was found that it positively affects firm value. The findings support upper echelon theory, suggesting that a CEO's characteristics reflect their firm's attributes and can influence strategic decisions such as green innovation, ultimately impacting the firm's value.

The research offers practical implications; for example, applying green innovation can serve as a tool for firms to enhance their value in the eyes of investors. Through such innovation, firms are viewed as being aware of the sustainability of their business environment. Therefore, it is advantageous for firms to continue developing their green innovations. Conversely, CEO overconfidence does not affect the relationship between green innovation and firm value. Firms should focus more on other managerial factors, such as competence and experience, rather than psychological traits such as excessive self-confidence, when evaluating the development of green innovation. A CEO's personality traits do not necessarily directly impact the shaping of a firm's green innovation policies or strategies.

This study has several limitations; for instance, it only considers nonfinancial firms in Indonesia as its research sample. Additionally, green innovation measurement relies on disclosures in annual and sustainability reports, which can introduce subjectivity. Future studies could broaden the sample to include ASEAN countries firms, making the findings more generalizable. Researchers could also explore alternative methods to measure green innovation, thereby reducing concerns over subjectivity.

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Conflict of Interest Statement

The authors declare no conflict of interest.

Data Availability Statement

The data associated with this study are available from the corresponding author upon reasonable request.

Author Contributions

Paulina Sutrisno (P.S.) conceived and designed the study; Elphan Agustinus Na Goppies (E.A.) collected the data; E.A. performed the statistical analysis; E.A. drafted the article; P.S. revised the article and approved the final version.

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References

- Agustia, D., Sawarjuwono, T., & Dianawati, W. (2019). The mediating effect of environmental management accounting on green innovation - Firm value relationship. *International Journal of Energy Economics and Policy*, 9(2), 299–306. <https://doi.org/10.32479/ijeep.7438>
- Asni, N., & Agustia, D. (2022). The mediating role of financial performance in the relationship between green innovation and firm value: evidence from ASEAN countries. *European Journal of Innovation Management*, 25(5), 1328–1347. <https://doi.org/10.1108/EJIM-11-2020-0459>
- Astuti, T., & Ahmar, N. (2025). Effects of green intellectual capital, green accounting, and green innovation on firm value: The moderating role of return on assets. *Environmental Economics*, 16(1), 1–12. [https://doi.org/10.21511/ee.16\(1\).2025.01](https://doi.org/10.21511/ee.16(1).2025.01)
- Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, 27(6), 625–641. <https://doi.org/10.1177/014920630102700601>
- Cho, K., Kim, H. J., Mun, S., & Han, S. H. (2021). Do confident CEOs increase firm value under competitive pressure? *Applied Economics Letters*, 28(17), 1491–1498. <https://doi.org/10.1080/13504851.2020.1827133>
- Dai, D., & Xue, Y. (2022). The impact of green innovation on a firm's value from the perspective of enterprise life cycles. *Sustainability*, 14(1226), 1–19. <https://doi.org/10.3390/su14031226>
- Fionita, I., Kufepaksi, M., & Hasnawati, S. (2022). CEO overconfidence, investment decisions and firm value in Indonesia. *Economic Annals-XXI*, 194(11–12), 49–58. <https://doi.org/10.21003/ea.V194-06>
- Gao, Y., & Han, K. (2020). Managerial overconfidence, CSR and firm value. *Asia-Pacific Journal of Accounting & Economics*, 29(6), 1600–1618. <https://doi.org/10.1080/16081625.2020.1830558>

- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193-206. <https://doi.org/10.5465/amr.1984.4277628>
- Hidayat, I., Hamdani, Abbas, D. S., Lam, N. T., & Sari, P. A. (2024). The role of environmental management accounting in mediating green innovation to firm value: Moderated by quality management. *International Journal of Energy Economics and Policy*, 14(3), 281–287. <https://doi.org/10.32479/ijeep.15869>
- Husnaini, W., & Tjahjadi, B. (2021). Quality management, green innovation and firm value: Evidence from Indonesia. *International Journal of Energy Economics and Policy*, 11(1), 255–262. <https://doi.org/10.32479/ijeep.10282>
- Kraft, P. S., Dickler, T. A., & Withers, M. C. (2025). When do firms benefit from overconfident CEOs? The role of board expertise and power for technological breakthrough innovation. *Strategic Management Journal*, 46(2), 381–410. <https://doi.org/10.1002/smj.3657>
- Lee, J. (2021). CEO overconfidence and voluntary disclosure of greenhouse gas emissions: with a focus on the role of corporate governance. *Sustainability (Switzerland)*, 13(11), 1-19. <https://doi.org/10.3390/su13116054>
- Lestari, K. C., & Soewarno, N. (2024). Do female directors influence firm value? The mediating role of green innovation. *Gender in Management*, 39(2), 255–273. <https://doi.org/10.1108/GM-08-2022-0281>
- Listiani, N., Nugrahanti, Y. W., Damayanti, T. W., & Supramono, S. (2024). Managerial overconfidence, cash flow, tax aggressiveness and firm value. *Montenegrin Journal of Economics*, 20(1), 47–57. <https://doi.org/10.14254/1800-5845/2024.20-1.5>
- Liu, L. (2024). Green innovation, firm performance, and risk mitigation: Evidence from the USA. *Environment, Development and Sustainability*, 26(9), 24009–24030. <https://doi.org/10.1007/s10668-023-03632-z>
- Mahmood, A., Mehmood, A., Terzani, S., De Luca, F., & Djajadikerta, H. G. (2025). The effect of ESG disclosure on firm value in the European context. *Management Decision*, 64 (7): 3023–3054. <https://doi.org/10.1108/MD-10-2024-2480>
- McCarthy, S., Oliver, B., & Song, S. (2017). Corporate social responsibility and CEO confidence. *Journal of Banking & Finance*, 75, 280–291. <https://doi.org/10.1016/j.jbankfin.2016.11.024>
- Mundi, H. S., & Kaur, P. (2019). Impact of CEO overconfidence on firm performance: An evidence from S&P BSE 200. *Vision*, 23(3), 1–10. <https://doi.org/10.1177/0972262919850935>
- Park, K. H., Byun, J., & Choi, P. M. S. (2020). Managerial overconfidence, corporate social responsibility activities, and financial constraints. *Sustainability (Switzerland)*, 12(1), 1–14. <https://doi.org/10.3390/SU12010061>
- Rizki, T., & Hartanti, D. (2021). Environmental responsibility, green innovation, firm value: Asean-5. *Journal of International Conference Proceedings*, 4(3), 464–476. <https://doi.org/10.32535/jicp.v4i3.1349>
- Samhadi, Roekhudin, & Syaiful Iqbal (2024). The moderating role of good corporate governance in the relationship between green innovation, environmental disclosure and firm value. *Jurnal Reviu Akuntansi dan Keuangan*, 14(3), 553–569. <https://doi.org/10.22219/jrak.v14i3.33925>

- Shah, S. S. H., Xinping, X., Khan, M. A., & Harjan, S. A. (2018). Investor and manager overconfidence bias and firm value: Micro-level evidence from the Pakistan Equity Market. *International Journal of Economics and Financial Issues*, 8(5), 190–199. <https://www.econjournals.com/index.php/ijefi/article/download/7028/pdf>
- Shao, Y., Zheng, M., Xu, X., & Ji, X. (2025). Does ESG performance have an impact on firm value? Evidence from the Chinese textile and garment industry. *Industria Textila*, 76(2), 249–256. <https://doi.org/10.35530/IT.076.02.2023126>
- Shen, Y. (2021). CEO characteristics: a review of influential publications and a research agenda. *Accounting & Finance*, 61(1), 361–385. <https://doi.org/10.1111/acfi.12571>
- Sutrisno, P., & Karmudiandri, A. (2020). CEO overconfidence, founder & restatement of financial reporting. *International Journal of Business, Economics and Law*, 23(1), 192–198. <https://www.ijbel.com/wp-content/uploads/2020/12/IJBEL23-249.pdf>
- Sutrisno, P., Utama, S., Anitawati Hermawan, A., & Fatima, E. (2022). Founder and descendant vs. professional CEO: Does CEO overconfidence affect tax avoidance in the Indonesia case? *Economies*, 10(12), 1–20. <https://doi.org/10.3390/economies10120327>
- Sutrisno, P., Utama, S., Hermawan, A. A., & Fatima, E. (2023). Do founder CEOs and overconfidence affect firm risk? *Accounting Research Journal*, 36(4–5), 434–452. <https://doi.org/10.1108/ARJ-09-2022-0234>
- Tang, C.-H., Lee, Y.-H., Lee, M.-C., & Huang, Y.-L. (2020). CEO characteristics enhancing the impact of CEO overconfidence on firm value after mergers and acquisitions - A case study in China. *Review of Pacific Basin Financial Markets and Policies*, 23(1), 1–19. <https://doi.org/10.1142/S0219091520500034>
- Ting, I. W. K., Azizan, N. A. B., & Kweh, Q. L. (2015). Upper echelon theory revisited: The relationship between CEO personal characteristics and financial leverage decision. *Procedia - Social and Behavioral Sciences*, 195, 686–694. <https://doi.org/10.1016/j.sbspro.2015.06.276>
- Wang, Y., Han, Y., Du, Q., & Hou, D. (2023). Executive overconfidence and corporate environmental, social, and governance performance. *Sustainability (Switzerland)*, 15(21), 1–22. <https://doi.org/10.3390/su152115570>
- Xie, Z., Wang, J., & Zhao, G. (2022). Impact of green innovation on firm value: Evidence from listed companies in China's heavy pollution industries. *Frontiers in Energy Research*, 9(January), 1–17. <https://doi.org/10.3389/fenrg.2021.806926>
- Yao, Q., Liu, J., Sheng, S., & Fang, H. (2019). Does eco-innovation lift firm value? The contingent role of institutions in emerging markets. *Journal of Business and Industrial Marketing*, 34(8), 1763–1778. <https://doi.org/10.1108/JBIM-06-2018-0201>
- Yuniarti, R., Soewarno, N., & Isnalita. (2022). Green innovation on firm value with financial performance as mediating variable: Evidence of the mining industry. *Asian Academy of Management Journal*, 27(2), 41–58. <https://doi.org/10.21315/aamj2022.27.2.3>
- Zhang, F., Qin, X., & Liu, L. (2020). The interaction effect between ESG and green innovation and its impact on firm value from the perspective of information disclosure. *Sustainability*, 12(5), 1866. <https://doi.org/10.3390/su12051866>