

Green Innovation as a Moderating: The Effects of ESG Disclosure and Financial Slack on Financial Performance

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ABSTRACT

The transition toward sustainable energy has encouraged companies in the energy sector to integrate sustainability practices through ESG disclosure, the management of financial slack, and the implementation of green innovation. This study examines the effects of ESG disclosure and financial slack on financial performance, with green innovation serving as a moderating variable. The sample consists of 16 energy sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period, yielding 64 observations selected through purposive sampling. The data were analysed using PLS-SEM with the SmartPLS program. The results indicate that ESG disclosure has a negative and significant impact on financial performance, whereas financial slack has a significant positive effect. Green innovation does not moderate the relationship between ESG disclosure and financial performance, but it does strengthen the effect of financial slack on financial performance. These findings suggest that the availability of financial slack supports green innovation, which in turn contributes to improving the financial performance of energy sector companies.

Keywords: Financial slack; Green Innovation; Sustainability; Financial Performance; ESG Disclosure;

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INTRODUCTION

The transition to a green economy has become a global strategic agenda as the urgency of reducing carbon emissions continues to increase. In Indonesia, the energy sector occupies a central position as both a major contributor to emissions and a pillar of national economic growth, making it a key target of emission reduction policies aimed at supporting the achievement of the Net Zero Emissions commitment by 2060 or earlier (Kementerian ESDM, 2024). The shift toward sustainable energy has encouraged companies to integrate sustainability practices into their business strategies. However, this transition also places pressure on financial performance because it requires investment in environmentally friendly technologies, increases operational costs, and exposes firms to volatility in energy commodity prices. As a result, companies face a dilemma between pursuing sustainability objectives and maintaining stable profitability.

These changing demands encourage companies to demonstrate responsibility and transparency to a wide range of stakeholders through the implementation of measurable sustainability practices. From the perspective of stakeholder theory, a company's sustainability and performance are influenced by its relationships with various stakeholders rather than shareholders alone. Companies therefore need to respond to stakeholder expectations through clear and transparent sustainability practices supported by market acceptance (Hamdouni, 2025). In addition, ESG disclosure can serve as a signal to stakeholders regarding a company's condition and future prospects, thereby reducing information asymmetry in the market (Agapova et al., 2025). In this context, ESG disclosure may be understood as a form of corporate communication through which firms demonstrate their commitment to sustainability while strengthening stakeholder confidence in their performance and long-term viability.

Companies in developing countries, including Indonesia, that adopt ESG practices effectively tend to show improvements in financial performance, driven by the role of sustainability in strengthening efficiency and risk management (Makhdalena et al., 2023). Improved ESG performance is also associated with higher profitability among global energy companies that implement sustainability principles (Naeem & Çankaya, 2022). Furthermore, ESG disclosure contributes to financial performance through sustainable finance practices and relevant green financing that encourage green innovation in the Indonesian energy sector (Aulia et al., 2023). Disclosure of environmental aspects within ESG, such as carbon emissions and green investment, has been shown to contribute to improved corporate financial performance, particularly in the energy subsector (Inawati & Rahmawati, 2023). Similarly, carbon emission disclosure, as one element of ESG disclosure, contributes to improved financial performance, especially when influenced by firm characteristics such as size and funding structure (Adelia, 2024).

ESG disclosure also contributes to the optimisation of financial performance, with the presence of a sustainability committee strengthening the implementation and effectiveness of sustainability practices within the company (Silviani et al., 2024). According to Circular Letter of the Financial Services Authority of the Republic of Indonesia Number 16/SEOJK.04/2021, a sustainability committee is a committee under the board of directors that is

responsible for monitoring and evaluating sustainability programmes. The existence of such a committee constitutes an important mechanism through which companies can ensure consistent ESG disclosure, the effective use of financial slack, and the development of green innovation in support of sustainable financial performance. Although ESG implementation is increasingly adopted by companies, empirical findings in the literature indicate that the contribution of each ESG pillar is not always directly reflected in financial performance. In particular, the social and governance dimensions of ESG have not yet shown an optimal role in improving financial performance in the energy sector (Pramitya Khairunnisa & Erna Widiastuty, 2023). Nevertheless, the achievement of strong ESG performance may encourage the development of green innovation, particularly when supported by digital transformation that enhances corporate competitiveness (C. Xu & He, 2025).

In this context, the availability of internal resources constitutes an important factor in explaining variation in the success of corporate sustainability strategy implementation. Conceptually, financial slack refers to a condition in which a company possesses excess financial resources, thereby allowing it to utilise those funds flexibly to address uncertainty and support long-term strategic investment (Nazwir & Raharja, 2024). From the perspective of the Resource-Based View, financial slack may be regarded as a strategic internal asset that enables companies to innovate and sustain their competitive advantage (Wijayanti et al., 2024). Empirically, financial slack has been identified as a factor that shapes the effectiveness of sustainability policies and green investment in influencing corporate performance, with its impact depending on the company's ability to allocate and utilise its financial resources effectively (Rafli et al., 2025).

Financial slack also plays a role in strengthening the effectiveness of corporate financial resource management through appropriate financial oversight mechanisms (Oke et al., 2025). These findings suggest that financial slack is not merely an indicator of liquidity, but may also function as an adaptive instrument that supports strategic decision-making oriented toward sustainability and innovation. Nevertheless, financial slack does not automatically increase profitability, as corporate reserves are not always used productively. This suggests that slack may have limited impact when it is not managed effectively, thereby requiring more disciplined reserve fund management in order to enhance profitability (Welly & Hermanto, 2025). The effectiveness of financial slack in supporting corporate performance and sustainability strategy is also influenced by the strength of formal institutions in each country (de Roo et al., 2025). In the context of sustainability, financial slack contributes to improving environmental performance and carbon emission reporting, thereby strengthening the reputation and competitive position of energy companies (Jaunanda & Putri, 2025).

In addition to financial support, a company's ability to translate sustainability practices into economic value is also influenced by the implementation of green innovation. Conceptually, green innovation may be viewed as a strategic instrument that links ESG disclosure and financial slack to financial performance, whereby sustainability commitments and funding capacity are converted into operational efficiency and value creation that contribute to improved financial performance. Green innovation refers to the development of

innovations in products, processes, and technologies designed to minimise environmental impacts while supporting corporate economic efficiency (Liu et al., 2024). Green innovation not only helps reduce environmental impacts, but also improves operational efficiency and corporate economic value, thereby influencing financial performance. The implementation of green innovation reflects a company's transformation toward low-carbon and sustainable operations (Ren et al., 2024). Green innovation may therefore be understood as a process through which sustainability commitments expressed in ESG disclosure and the availability of financial resources reflected in financial slack are translated into operational efficiency and improved financial performance.

Several empirical studies have found that green innovation may improve corporate financial performance by promoting operational efficiency and business process effectiveness, although in the short term it may also create pressure on investment costs because of the need to develop sustainable technologies (Lin, 2025; Siagian & Siagian, 2025). The implementation of green innovation within a company may enhance efficiency in operational processes, while effective resource utilisation may create opportunities for improved financial performance (Wedari & Alfian, 2024).

However, ESG disclosure has not consistently been shown to have a direct effect on financial performance, and green innovation has not always been able to mediate this relationship. In other words, although ESG disclosure may encourage greater green innovation, this process has not necessarily been translated into higher profitability (Widoretno et al., 2025). Green innovation may instead place pressure on profitability because of its high investment costs, particularly in highly polluting industries, and this effect appears to depend heavily on a company's financial slack capacity. These empirical findings indicate that the financial capacity to provide organisational flexibility significantly influences the extent to which green innovation can contribute to corporate financial performance (Batool et al., 2025). ESG disclosure does not appear to have a direct effect on the financial performance of energy sector companies in Indonesia, but the relationship becomes positive when moderated by green innovation (Meylani & Martdian Ratna Sari, 2025). This suggests that green innovation functions as a reinforcing mechanism through which companies are better able to translate sustainability practices into improved profitability.

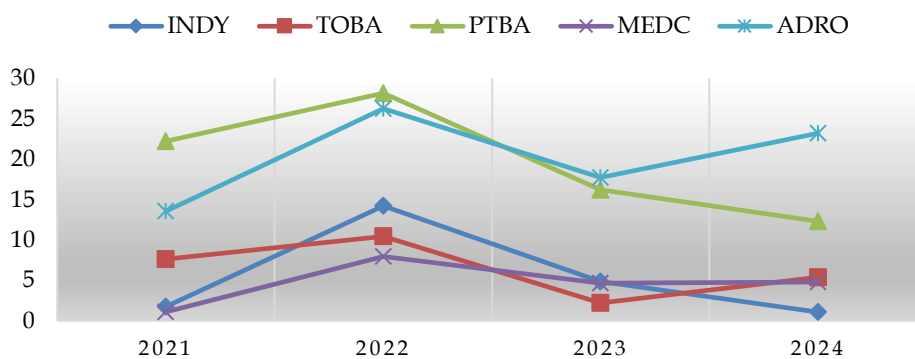


Figure 1. ROA Graph for Energy Sector Companies in

Source: Research Data, 2026

Based on ROA data for energy sector companies during the 2021–2024 period, financial performance appears to have been relatively volatile. INDY recorded a low ROA of 1,72% in 2021, largely due to rising production and operational costs, before increasing sharply to 14,21% in 2022 as the post-pandemic economic recovery stimulated energy demand and improved the company's net profit. However, in 2023, INDY's ROA declined to 4,85% as a result of weakening energy demand and pressure on commodity prices. It then decreased further to 1,07% in 2024 owing to continued market pressure and business diversification that remained in its early stages, with new business lines not yet making a significant contribution to profitability. TOBA recorded an ROA of 7,65% in 2021 amid fluctuations in energy prices and sales volume, which rose to 10,44% in 2022 as global demand increased. This was followed by a decline to 2,20% in 2023 due to weakening exports and rising operational costs under conditions of global market uncertainty, before recovering to 5,37% in 2024 as a result of diversification into renewable energy and waste management, although initial investment costs continued to place pressure on profitability.

PTBA recorded an ROA of 22,25% in 2021, which increased to 28,17% in 2022 due to strong energy demand and improved operational efficiency, before declining to 16,23% in 2023 and 12,30% in 2024 as a result of the economic slowdown and rising production costs. MEDC recorded an ROA of 1,10% in 2021, which increased to 7,95% in 2022 as energy prices recovered, then declined to 4,63% in 2023, and improved slightly to 4,80% in 2024 amid price fluctuations and ongoing efforts to strengthen operational efficiency. Meanwhile, ADRO reported an ROA of 13,56% in 2021, which rose sharply to 26,26% in 2022 owing to favourable market conditions and operational efficiency, declined to 17,71% in 2023 due to pressure in the global energy market, and then rebounded to 23,22% in 2024 as a result of market expansion and effective adaptation strategies. This pattern of instability suggests that ESG disclosure and the utilisation of financial slack may not yet have been optimally translated into the maintenance of financial performance, particularly when green innovation has not been implemented consistently. This condition indicates the need for empirical testing to understand how the combination of ESG disclosure, financial slack, and green innovation may influence the financial performance of energy sector companies.

Green innovation has been shown to play a role in strengthening the effect of ESG disclosure on financial performance, thereby generating a more favourable financial impact. Innovation activities directed toward energy efficiency, environmentally friendly product development, and efforts to reduce emissions undertaken by companies contribute to the optimisation of corporate financial performance (Sumayyah et al., 2025). The environmental dimension of ESG practices, when supported by green innovation, also contributes to improved financial performance through the implementation of sustainable environmental management (Bibi & Narsa, 2022). These findings suggest that green innovation plays a strategic role in linking the implementation of sustainability practices with corporate financial performance.

In line with this phenomenon, this study aims to analyse the influence of ESG disclosure and financial slack on the financial performance of energy sector companies in Indonesia, and to assess whether green innovation, as a moderating

variable, strengthens or weakens this relationship. The findings are expected to contribute to a better understanding of how energy sector companies may improve profitability while maintaining operational sustainability more effectively through the use of green innovation.

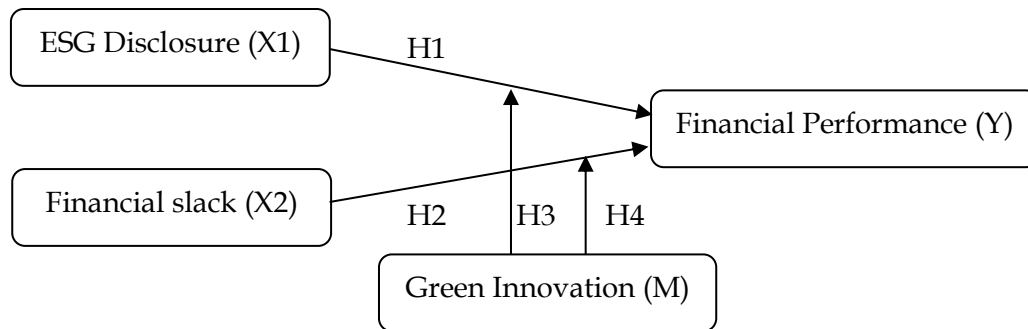


Figure 2. Research Model

Source: Research Data, 2026

Stakeholder theory emphasises the importance of responding to stakeholder expectations through ESG disclosure as a form of accountability that may contribute to improved financial performance and corporate sustainability (Aryati & Susilawati, 2025). Companies with higher levels of ESG disclosure are generally perceived as more responsible, which may strengthen stakeholder trust and, in turn, improve financial performance. ESG implementation has been shown to contribute positively to corporate financial performance (Rahmadini & Hartanti, 2025). Likewise, transparency in ESG disclosure has been found to have a significant effect on financial performance (Wardani et al., 2025). The disclosure of ESG information is also considered to encourage improvements in financial performance, thereby supporting the formulation of a hypothesis concerning a positive relationship between ESG disclosure and financial performance (Sukma Subagio & Indira Subagio, 2025). An increase in the level of ESG disclosure is therefore expected to increase the potential for improved financial performance (Prihandini, 2024). Accordingly, transparency in ESG disclosure may contribute to higher corporate profitability.

H₁: ESG disclosure has a positive effect on the financial performance of energy sector companies.

The Resource-Based View explains that the ability to manage valuable internal financial resources constitutes an important basis of competitive advantage, including financial slack, which companies may utilise to undertake strategic and sustainable activities that support financial performance (Saputra et al., 2025). Financial slack provides management with flexibility in determining strategic actions and making investments that support corporate growth. It may also function as a financial buffer, enabling companies to navigate uncertain conditions while supporting improved performance (Chan et al., 2023). Nevertheless, financial slack may improve financial performance when maintained at an appropriate level, but may also reduce performance when it becomes excessive (Hailu et al., 2020). Financial slack has been found to have a positive effect on corporate performance because cash reserves can help strengthen

financial performance (Zhou, 2023). The availability of flexible financial resources therefore enables companies to create efficiencies, strengthen their financial structure, and enhance long-term profitability.

H₂: Financial slack has a positive effect on the financial performance of energy sector companies.

Signaling Theory suggests that ESG performance and disclosure function as strategic signals to the market and to stakeholders regarding a company's commitment to sustainability practices, thereby strengthening trust and shaping perceptions of corporate quality (Xiao et al., 2025). Companies that intensively implement green innovation are generally viewed as more competitive and more adaptable to the sustainability agenda, which may improve efficiency, reputation, and profitability. Such innovation encourages the development of environmentally friendly processes that not only ensure regulatory compliance but also enhance market and investor confidence in the company. Furthermore, green innovation plays an important role in improving a company's ESG performance, as the adoption of technology and processes contributes positively to ESG practices (L. Xu et al., 2025). Green innovation has also been shown to strengthen the effect of ESG disclosure on financial performance, resulting in a more favourable financial impact when the two are combined (Khanchel et al., 2023). Strong ESG performance may improve corporate performance, with green technology innovation serving as an intermediary mechanism, so that green innovation functions as a strategic channel through which financial performance may be enhanced (Chen et al., 2024). This condition indicates that green innovation may strengthen the influence of ESG disclosure on corporate profitability.

H₃: Green innovation positively moderates the relationship between ESG disclosure and the financial performance of energy sector companies.

The Resource-Based View explains that companies may achieve competitive advantage through the management of scarce and difficult-to-imitate resources, including internal financial reserves that support green innovation and thereby enable firms to improve performance in a sustainable manner (Ruan et al., 2022). Green innovation not only increases added value but also strengthens the effectiveness of internal resource utilisation, including financial slack. In practical terms, companies that possess financial slack and are able to allocate it to support green innovation are likely to be more flexible in responding to change and in exploiting investment opportunities, thereby improving corporate performance more effectively. Green innovation, both in process and product form, has also been shown to have a positive effect on financial performance (Wang & Ahmad, 2024; Widyantoro et al., 2025). Financial slack improves financial performance because it provides companies with financial flexibility (Nazwir & Raharja, 2024). Moreover, companies with slack resources are better positioned to strengthen the effectiveness of green practices in improving sustainability performance (Ramadana et al., 2025). Financial slack also functions as an enabler of innovative investment, including research and development, which in turn supports company performance (Yu et al., 2025). These findings suggest that green innovation may strengthen the influence of financial slack on financial performance.

H₄: Green innovation positively moderates the relationship between financial slack and the financial performance of energy sector companies.

RESEARCH METHODS

This study adopts a quantitative approach in which numerical data are analysed using statistical techniques. The population consists of energy sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The sample was determined using purposive sampling, namely companies that consistently published annual reports and sustainability reports during the observation period. Based on this selection process, 16 companies met the research criteria, resulting in 64 firm-year observations.

ESG disclosure refers to a company’s disclosure of Environmental, Social, and Governance aspects as a form of sustainability transparency (Putri et al., 2025). The measurement of ESG disclosure is based on the Global Reporting Initiative (GRI) Standards 2021, which serve as the primary reference for disclosure standards. The 2021 GRI consists of three main dimensions, namely Environmental (31 indicators), Social (39 indicators), and Governance (13 indicators). During the observation period, several companies still used the 2016 GRI Standards in their sustainability reports. To maintain consistency and comparability across companies, all ESG disclosures were therefore adjusted through an indicator-mapping process, whereby the substance of the 2016 GRI disclosures was aligned with the 2021 GRI indicator framework. Each ESG indicator was scored using a dummy scale. Disclosed information was assigned a score of 1, whereas undisclosed information was assigned a score of 0. The measurement formula is as follows:

$$ESG\ Score = \frac{\text{Number of ESG Items Disclosed}}{\text{Total ESG Indicator Items}} \times 100\% \dots\dots\dots(1)$$

Financial slack is the financial resources available within a company that can serve as a buffer or reserve to address external disruptions and support changes in corporate strategy (Chan et al., 2023). Financial slack provides management with room to adapt, innovate, and improve financial performance. In the energy sector, high financial slack strengthens the ability to allocate resources for sustainability and the development of long-term green innovations. Financial slack is measured by the formula:

$$FS = \frac{\text{Current Assets} - \text{Current Liabilities}}{\text{Total Assets}} \dots\dots\dots(2)$$

Financial performance is defined as a company's ability to manage and optimize assets to generate profits (Tuti et al., 2025). Financial performance is proxied by Return on Assets (ROA), a ratio that describes the level of profit a company generates from the utilization of its total assets. The formula for measuring financial performance is as follows:

$$ROA = \frac{\text{Net Profit}}{\text{Total Assets}} \times 100\% \dots\dots\dots(3)$$

Green innovation is the development of organizational innovations oriented towards reducing environmental impact by increasing resource efficiency, preventing pollution, and implementing sustainable business practices (Cisneros Chavira et al., 2023). Furthermore, green innovation is reflected in the implementation of operational process innovations and managerial innovations

that integrate environmentally friendly principles into company activities. This innovation is measured using the Green Process Innovation (GPROC) indicator, which encompasses various initiatives, such as reducing resource and energy consumption and increasing their efficiency (GPROC1), using recycled materials and technology (GPROC2), implementing environmental campaigns (GPROC3), using pollution control equipment (GPROC4), and adopting pollution control projects and technologies (GPROC5). Each company is given a score of 1 if it meets the established criteria, while a score of 0 is given if the company does not meet the criteria (Seviana & Sumarta, 2025). By implementing these various aspects, companies are able to strengthen their sustainability orientation while increasing operational efficiency and competitiveness in the energy sector. The formula for measuring green innovation is as follows:

$$GI = \frac{\text{Number of Green Innovation Items Disclosed}}{\text{Total Green Innovation Indicator Items}} \times 100\% \dots \dots \dots (4)$$

The data analysis for this study began with descriptive statistics to describe the conditions and characteristics of the data for each variable. Next, the research model was tested using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach, analyzed using SmartPLS software. This approach was chosen because it is a variant-based method that is able to analyze the relationship between variables simultaneously, including testing the moderating effect through interaction variables (Hair et al., 2021). This study used a one-period lag, where the independent and moderating variables were measured in year t, while the dependent variable was measured in year t+1. This research model is formulated in the form of the following equation:

$$Y_{t+1} = a + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 M_t + \beta_4 (X_{1t} \times M_t) + \beta_5 (X_{2t} \times M_t) + \epsilon \dots \dots \dots (5)$$

Where:

- Y_{t+1} = Financial performance
- X_{1t} = ESG disclosure
- X_{2t} = Financial slack
- M_t = Green innovation (moderation)
- a = Constant
- $\beta_1-\beta_5$ = Regression coefficient
- $X_{1t} \times M_t, X_{2t} \times M_t$ = Moderation interaction
- ϵ = Error

RESULTS AND DISCUSSION

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ESG Disc	64	0,108	0,964	0,582	0,264
FS	64	-0,498	0,605	0,130	0,170
GI	64	0,400	1,000	0,822	0,227
ROA	64	0,001	0,454	0,101	0,087

Source: Research Data, 2026

The characteristics of the data are described through descriptive statistical analysis, which includes the minimum, maximum, mean, and standard deviation values of each variable. The results of the analysis show that ESG disclosure has a minimum value of 0,108 and a maximum value of 0,964, with a mean of 0,582 and a standard deviation of 0,264. The standard deviation, which is lower than the

mean, indicates that the distribution of the data is relatively limited. At the same time, the wide range between the minimum and maximum values reflects variation in the level of ESG disclosure among the sample companies. Financial slack has a minimum value of -0,498 and a maximum value of 0,605, with a mean of 0,130 and a standard deviation of 0,170. The standard deviation, which exceeds the mean, indicates considerable variation in financial slack across companies, suggesting that their capacity to provide additional financial resources also differs.

Furthermore, the green innovation variable has a minimum value of 0,400 and a maximum value of 1,000, with a mean of 0,822 and a standard deviation of 0,227. The relatively high mean indicates that most companies in the sample have implemented green innovation practices, although the extent of implementation still varies across companies, as reflected in the standard deviation. The financial performance variable, proxied by ROA, has a minimum value of 0,001 and a maximum value of 0,454. Its mean value is 0,101, with a standard deviation of 0,087. A standard deviation lower than the mean indicates that variation in financial performance across companies during the study period is relatively moderate.

PLS-SEM analysis comprises two main components, namely the outer model and the inner model (Hair et al., 2021). Outer model testing was conducted to evaluate the measurement quality of the indicators used to represent the research variables. The outer model is presented as follows:

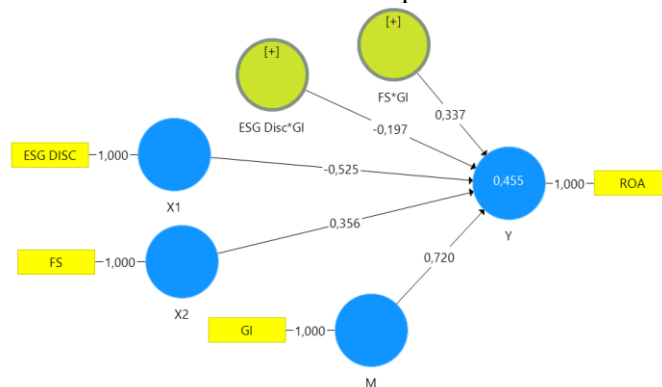


Figure 3. Outer model

Source: Research Data, 2026

Table 2. Outer Loadings

	ESG Disc	FS	GI	ESG Disc*GI	FS*GI	ROA
ESG Disc	1,000					
FS		1,000				
GI			1,000			
ESG Disc*GI				0,850		
FS*GI					0,906	
ROA						1,000

Source: Research Data, 2026

The outer model was tested by assessing the outer loadings, with a criterion of $> 0,70$ (Hair et al., 2021). The test results showed that the ESG disclosure, financial slack, green innovation, and ROA measurement components had outer loadings of 1,000. Meanwhile, the interaction construct between ESG disclosure and green innovation was 0,850, and between financial slack and green innovation

was 0,906, also exceeding the minimum criterion. Thus, all indicators were declared valid.

Inner model analysis is conducted to assess the strength and significance of the relationships between variables in the research model. There are four stages of testing in this analysis: collinearity testing, model strength assessment, model predictive ability testing, and significance level analysis (Hair et al., 2021).

Table 3. Collinearity Statistics (VIF)

	VIF Outer Model	VIF Inner Model
ROA	1,000	
ESG Disc*GI	1,000	1,793
FS*GI	1,000	1,085
GI	1,000	4,572
ESG Disc	1,000	3,362
FS	1,000	1,137

Source: Research Data, 2026

Collinearity testing is carried out to ensure that there is no excessively high relationship between predictor variables that could affect the accuracy of path coefficient estimates. A model is considered free from collinearity if the Variance Inflation Factor (VIF) value is < 5 (Hair et al., 2021). The analysis findings showed that each variable obtained a VIF value lower than the required limit. Based on the test results, this research model can be concluded to be free from multicollinearity.

Table 4. Coefficient of Determination (R²), Adjusted R², Predictive Relevance (Q²) and Effect Size (F²).

	F ²	(R ²)	Adjusted R ²	(Q ²)
ROA		0,455	0,408	0,383
ESG Disc*GI	0,029			
FS*GI	0,158			
M	0,208			
ESG Disc	0,150			
FS	0,204			

Source: Research Data, 2026

Model evaluation used the coefficient of determination (R²), Adjusted R², effect size (f²), and predictive relevance (Q²) as the primary metrics for assessing model fit (Hair et al., 2021). The analysis yielded an R² value of 0,455, indicating that the research model explained 45,5% of the variation in the dependent variable. Meanwhile, the remaining 54,5% of the variation was influenced by factors not included in the variables analyzed in this study. The Adjusted R² value of 0,408 indicates that, after accounting for the number of predictor variables in the model, the model's ability to explain changes in the dependent variable reached 40,8%. Referring to the criteria presented by (Hair et al., 2021), this value is considered moderate. Furthermore, a Q² value of 0,383 (> 0) indicates that the research model has predictive power for endogenous variables (Hair et al., 2019).

The relative contribution of each predictor variable in the model can be assessed using the effect size (f²) with criteria of 0,02 (small), 0,15 (medium), and 0,35 (large) (Hair et al., 2021). The analysis revealed that the financial slack (0,204) and green innovation (0,208) variables have a moderate influence on financial performance. The ESG disclosure variable (0,150) and the interaction between

financial slack and green innovation (0,158) also fall into the moderate influence category, while the interaction between ESG disclosure and green innovation (0,029) shows a small influence on financial performance. Overall, the findings of this study indicate that the applied model is quite effective in projecting and predicting the research variables.

Table 5. Hypothesis Test Results (Path Coefficients)

	Beta (β)	St. Dev	t-Statistics	P- Values
ESG Disc -> ROA	-0,525	0,209	2,512	0,012
FS -> ROA	0,356	0,099	3,586	0,000
ESG Disc*GI -> ROA	-0,197	0,116	1,696	0,090
FS*GI -> ROA	0,337	0,088	3,823	0,000

Source: Research Data, 2026

Hypothesis testing is carried out based on the t-statistic and p-value values from the bootstrapping results. A hypothesis is considered significant when the t-statistic exceeds 1,96 and the significance level is below 0,05 (Hair et al., 2021).

Hypothesis 1 indicates that ESG disclosure has a negative and significant effect on financial performance in energy sector companies in Indonesia, thus Hypothesis 1 is rejected because the direction of the relationship is contrary to the proposed hypothesis. This result indicates that a higher level of ESG disclosure is associated with lower financial performance. Within the framework of stakeholder theory, companies are not only oriented towards shareholder interests but also responsible to various stakeholders, such as the community, employees, and the environment. Therefore, companies are encouraged to increase transparency through ESG disclosure as a form of commitment to sustainability. However, implementing ESG practices generally requires significant resource allocation, such as investment in environmentally friendly technology, improved operational standards, and additional reporting costs. This condition causes increased operational costs in the short term, potentially reducing the company's profitability. The negative relationship found in this study indicates that the economic benefits of ESG disclosure cannot be felt directly in the short term but tend to be long-term. The findings of this study are consistent with those of (Aryati & Susilawati, 2025; Lita & Faisol, 2025; Rahmania et al., 2025; Sambuaga, 2024), which indicate that ESG disclosure does not necessarily improve short-term financial performance. This suggests that the economic benefits of sustainability practices are generally only visible over a longer period. Therefore, companies need to strategically integrate ESG practices into their operations to focus not only on reporting but also on creating operational efficiency and sustainable economic value.

Hypothesis 2 shows that financial slack has a positive and significant effect on the financial performance of energy sector companies in Indonesia, and thus Hypothesis 2 is accepted. These results indicate that greater availability of financial resources provides a greater opportunity for companies to increase their profitability. From a Resource-Based View perspective, a company's competitive advantage can be achieved through the utilization and management of strategically valuable resources. Financial slack is a form of cash reserves that companies have to respond to changes in the business environment and make more targeted investment decisions. In the energy sector, known as a capital-

intensive industry requiring significant investment, financial slack provides flexibility in supporting operational activities, strengthening financial structures, and allocating funds to projects that can boost company efficiency and performance. The results of this study are consistent with various previous studies showing that financial slack has a positive influence on financial performance (Hailu et al., 2020; Jin et al., 2022; Perdanaputra & Hersugondo, 2024)..

Hypothesis 3 shows that green innovation does not significantly moderate the effect of ESG disclosure on financial performance in energy sector companies in Indonesia, and thus Hypothesis 3 is rejected. This result indicates that green innovation has not been able to strengthen or weaken the relationship between ESG disclosure and financial performance, and therefore does not act as a moderating variable in this relationship. From a signaling theory perspective, ESG disclosure is seen as a signal sent by a company to stakeholders regarding its commitment to sustainable practices. However, the presence of green innovation has not been able to increase the effectiveness of this signal in driving financial performance. This condition is caused by the characteristics of green innovation, which requires large investments and a relatively long time before producing tangible financial benefits, so its impact was not yet visible during the study period. Furthermore, in the capital-intensive energy industry, the implementation of green innovation is more focused on complying with environmental regulations and reducing ecological impacts rather than increasing short-term profitability. Consequently, green innovation is unable to change the direction or strength of the relationship between ESG disclosure and financial performance. The findings of this study are also consistent with previous studies (Astari et al., 2025; Mushi, 2025), which found that green innovation was not able to moderate the relationship between ESG disclosure and financial performance. This condition suggests that although green innovation is important in supporting corporate sustainability practices, its economic benefits are not always immediately reflected in improved financial performance.

Hypothesis 4 shows that green innovation has a positive and significant effect in moderating the influence of financial slack on financial performance in energy sector companies in Indonesia, and thus Hypothesis 4 is accepted. These results indicate that the existence of adequate financial resource reserves provides an opportunity for companies to implement green innovation more effectively, thereby increasing their profitability. Based on the Resource-Based View perspective, a company's competitive advantage is achieved through the use of scarce or limited financial resources. Financial slack provides financial flexibility for companies to make strategic investments, including in the development of green innovation. When companies have sufficient financial reserves available, the implementation of green innovation can be carried out more optimally without causing excessive financial pressure. In the energy sector, innovation can be implemented through various steps, such as increasing the efficiency of energy utilization, reducing carbon emissions, and implementing pollution control technologies. The implementation of green innovation not only supports the company's sustainability efforts but also has the potential to increase the efficiency of operational activities while strengthening the company's reputation among stakeholders. Financial slack plays a crucial role in supporting the implementation

of green innovation, thereby generating economic value for the company. The findings of this study are supported by several previous studies showing that the presence of slack resources, including financial slack, contributes positively to a company's ability to implement innovation and sustainability strategies that may improve financial performance (Guo et al., 2020; Tariq et al., 2023; Vitale et al., 2023). In addition, previous studies (Liu et al., 2024; Maghfuriyah et al., 2024) also found that green innovation can improve financial performance by increasing operational efficiency and strengthening corporate reputation.

CONCLUSION

This study aims to analyse the influence of ESG disclosure and financial slack on the financial performance of energy sector companies in Indonesia and to assess the role of green innovation as a moderating variable. The findings indicate that ESG disclosure has a significant negative effect on financial performance, whereas financial slack has a positive effect on corporate financial performance. Furthermore, green innovation was not found to moderate the relationship between ESG disclosure and financial performance, although it did strengthen the relationship between financial slack and financial performance. These results suggest that the availability of adequate financial resources enables energy sector companies to implement green innovation more effectively, thereby supporting improved financial performance. On this basis, the study provides empirical evidence on the role of financial slack in supporting the effectiveness of green innovation in enhancing financial performance among energy sector companies.

At the same time, this study has limitations, particularly in relation to the relatively low explanatory power of the model in accounting for corporate financial performance. These findings suggest that the financial performance of energy sector companies is not determined solely by ESG disclosure, financial slack, and green innovation. Future studies may therefore consider incorporating additional variables, extending the observation period, and employing alternative proxies or a mixed-methods approach in order to capture more comprehensively the long-term effects of sustainability practices and green innovation on corporate financial performance.

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