

The Impact of Return on Equity and ESG Disclosure on Sustainable Growth Rate: The Mediating Role of Green Innovation

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Abstract

This study examines the effects of Return on Equity (ROE) and Environmental, Social, and Governance (ESG) Disclosure on Sustainable Growth rate (SGR), with Green Innovation (GI) serving as a mediating variable. The study addresses the limited empirical evidence on whether financial performance and ESG transparency contribute to sustainable corporate growth through green innovation. This quantitative study employs balanced panel data from 34 companies listed on the Indonesia Stock Exchange over the 2021-2025 period, resulting in 170 firm-year observations. Panel regression is applied, with the Fixed Effects Model used for the GI equation and the Random Effects Model for the SGR equation. The results show that ROE does not significantly affect GI ($\beta = -0.01434$; $p = 0.895$), while ESG Disclosure also has no significant effect on GI ($\beta = -0.02664$; $p = 0.821$). GI does not significantly affect SGR ($\beta = -0.09795$; $p = 0.449$). However, ROE has a positive and significant effect on SGR ($\beta = 1.19948$; $p < 0.001$), whereas ESG Disclosure has no significant direct effect ($\beta = 0.08981$; $p = 0.125$). Bootstraps results further indicate that GI does not mediate the effects of ROE or ESG Disclosure on SGR, as the 95% confidence intervals include zero. This study contributes empirical evidence that sustainable corporate growth in the observed firms is more directly associated with financial performance than with ESG disclosure or green innovation mechanisms. The findings provide implications for managers and policymakers to strengthen their integration of financial performance with substantive green innovation rather than relying primarily on ESG disclosure.

Keywords:

Return on Equity; ESG Disclosure; Green Innovation; Sustainable Growth Rate; Panel Data.

JEL Code: please refers to <https://www.aeaweb.org/jel/guide/jel.php>

INTRODUCTION

The global energy transition and the strengthening of sustainability regulations have increasingly encouraged corporations to balance financial performance with environmental and social responsibilities (Cardillo & Basso, © Authors. Published by Fakultas Ekonomi Universitas Negeri Surabaya, Indonesia. This article is published under Creative Commons Attribution License (Creative Commons: Attribution-NonCommercial 4.0 International) <https://creativecommons.org/licenses/by/4.0/legalcode>.

2025a; Dai et al., 2025; R. Li et al., 2026a). Sustainable corporate growth has consequently become an important concern for managers and investors because firms are required to maintain financial expansion while responding to increasing sustainability expectations (Thun et al., 2024; Zopounidis & Lemonakis, 2024). The Sustainable Growth Rate (SGR) provides an important financial indicator for assessing the maximum rate at which a firm can grow its sales and assets without changing its existing capital structure or raising additional external equity (Feronika & Sari, 2026). The achievement of sustainable growth is therefore closely associated with the firm's ability to generate internal financial resources and manage its non-financial sustainability commitments (Ng et al., 2025; Suhatmi et al., 2024). Return on Equity (ROE) represents an important measure of internal financial performance, whereas Environmental, Social, and Governance (ESG) disclosure represents a key dimension of corporate sustainability transparency (Dewi Lestari & Wahyuni, 2024; Kunaifi et al., 2026).

Return on Equity reflects the efficiency with which a firm generates profits from shareholders' equity and has a direct relationship with the firm's capacity to finance growth internally. Firms with higher ROE generally possess greater potential to generate retained earnings that can be reinvested in business expansion. Sustainable growth theory developed by Higgins (1981) emphasizes the importance of profitability and earnings retention in determining a firm's sustainable growth capacity (Ashta, 2008; Guliyev & Muzaffarov, 2024a). Van Horne (2009) similarly explains that sustainable growth is associated with the firm's ability to expand while maintaining its financial policies and capital structure (Huang & Liu, 2009; Varadarajan, 1983). Recent empirical studies have also identified profitability, particularly ROE, as an important determinant of sustainable growth (Battisti et al., 2025; Feronika & Sari, 2026). The relationship between ROE and SGR consequently provides a fundamental financial mechanism through which firms can sustain growth without excessive reliance on external financing (Erawati et al., 2025).

ESG disclosure introduces a non-financial dimension to the analysis of sustainable corporate growth. Comprehensive ESG disclosure can reduce information asymmetry between firms and stakeholders, strengthen organizational legitimacy, and provide signals regarding corporate commitment to sustainability (Cardillo & Basso, 2025b; Fernandez et al., 2025; Harymawan et al., 2026). Legitimacy theory suggests that sustainability-related disclosure enables firms to demonstrate conformity with societal expectations, while signaling theory emphasizes the role of disclosure in communicating otherwise difficult-to-observe information to external stakeholders (Khan, 2022; Magalhães, 2026). Improved transparency may contribute to corporate reputation, stakeholder confidence, and access to

financial resources (Liu et al., 2023; Manginte, 2024; Sari & Muslim, 2024). The economic consequences of ESG disclosure are not necessarily immediate or uniformly positive. Disclosure activities may generate reporting and compliance costs, expose strategic information, and create additional organizational demands (Frankel et al., 2025; L. Li et al., 2024; Tsang et al., 2023; K. Wang et al., 2025). The distinction between substantive sustainability practices and symbolic disclosure is also important because extensive disclosure does not necessarily indicate corresponding improvements in corporate sustainability performance. These conditions create uncertainty regarding whether ESG disclosure directly contributes to firms' sustainable growth (Dong et al., 2024; Guo et al., 2025; R. Li et al., 2026b).

Green Innovation provides a potential mechanism linking corporate resources and sustainability-oriented activities to long-term growth. Green innovation encompasses the development or adoption of environmentally friendly products, production processes, technologies, and organizational practices (Cisneros Chavira et al., 2023; Marini Purwanto, 2024). The Resource-Based View (RBV) conceptualizes green innovation as a strategic organizational capability that can generate valuable and difficult-to-imitate resources, while the Porter Hypothesis suggests that appropriately designed environmental initiatives may stimulate innovation and improve competitive performance (Dong et al., 2024; Y. Li et al., 2018; J. Zhang et al., 2026). Green innovation may therefore enable firms to transform financial resources and sustainability information into operational and technological capabilities that support long-term value creation (Z. Li et al., 2024). The financial consequences of green innovation may also involve substantial uncertainty. Research and development expenditure, technological experimentation, implementation costs, and lengthy commercialization periods can require considerable financial resources before economic benefits are realized (Dong et al., 2024; Z. Zhang & Li, 2026). Green innovation may consequently represent both a potential source of long-term competitive advantage and a short-term financial burden.

The relationship between ESG disclosure and green innovation is particularly relevant because disclosure represents the communication dimension of sustainability, whereas green innovation reflects a more substantive organizational response (Ruan et al., 2024a). Firms that provide extensive ESG information may face greater pressure from stakeholders to implement environmentally responsible technologies and processes (Bolognesi et al., 2025; Khamisu et al., 2024). Such disclosure may also improve internal awareness of environmental objectives and facilitate stakeholder engagement that supports innovation. Empirical evidence indicates that ESG information disclosure can promote corporate green

innovation. The existence of ESG disclosure does not, nevertheless, guarantee substantive environmental innovation. Decoupling between sustainability communication and actual organizational practices may occur when firms emphasize disclosure without making proportional investments in environmental technologies or processes. This distinction is important for understanding whether ESG disclosure can contribute to SGR through green innovation rather than merely through enhanced transparency (X. Li et al., 2025; Marfu et al., 2026).

The Indonesian capital market provides a relevant setting for examining these relationships. Indonesia is one of the major emerging economies in Southeast Asia, characterized by increasing attention to sustainable finance and corporate sustainability reporting. Financial Services Authority Regulation No. 51/POJK.03/2017 established sustainability-related reporting requirements within Indonesia's financial-services regulatory framework and contributed to the development of sustainability reporting practices. Non-financial companies operating in this environment may simultaneously face pressures to maintain financial growth, comply with sustainability expectations, and allocate resources to environmentally oriented investments. Constraints in internal capital allocation, relatively high costs of environmentally friendly technologies, technological uncertainty, and uncertain short-term returns can affect firms' decisions concerning green innovation (Cardillo & Basso, 2025a; Kunaifi et al., 2026; Z. Zhang & Li, 2026). These characteristics make Indonesian non-financial companies an appropriate empirical context for examining whether financial performance and sustainability disclosure are translated into sustainable growth through green innovation.

The existing literature has predominantly examined the relationship between sustainability-related factors and market-based outcomes, such as firm value and Tobin's Q, or accounting-based performance measures, including ROA and ROE. Research directly examining the simultaneous relationships between ROE, ESG disclosure, and SGR remains comparatively limited (Cardillo & Basso, 2025a; Dai et al., 2025; Kunaifi et al., 2026). The role of green innovation as a mediating mechanism also remains insufficiently examined. A substantial part of the existing literature implicitly assumes that stronger ESG disclosure leads to substantive environmental innovation and subsequently improves corporate outcomes. The possibility of decoupling between disclosure and actual innovation challenges this assumption because the extent of ESG disclosure may not correspond to firms' actual investment in green technologies, processes, or products (R. Li et al., 2026a; Y. Ma & Han, 2026). The limited empirical evidence on whether green innovation transmits the effects of ROE and ESG disclosure to

sustainable growth therefore creates an important research gap, particularly in the context of Indonesian non-financial companies.

This study examines the effects of ROE and ESG disclosure on SGR and investigates the mediating role of green innovation among non-financial companies listed on the Indonesia Stock Exchange during 2021–2025. The study integrates sustainable growth theory with signaling theory and the Resource-Based View to examine the financial and sustainability mechanisms underlying corporate growth in an emerging-market context. The empirical framework distinguishes ESG disclosure as a communication and transparency mechanism from green innovation as a substantive organizational capability. The mediation analysis further evaluates whether green innovation transmits the effects of financial performance and ESG disclosure to sustainable growth using a bootstrap approach. The study is expected to contribute to the sustainability management literature by providing empirical evidence on the extent to which financial performance, ESG transparency, and green innovation are associated with sustainable corporate growth. The findings also provide practical insights for corporate managers regarding the alignment of financial resources with substantive sustainability initiatives and for policymakers seeking to strengthen the integration of corporate financial objectives with environmental innovation.

LITERATURE REVIEW

Sustainable Growth Rate

Sustainable Growth Rate (SGR) refers to the maximum rate at which a firm can grow without altering its existing financial policies, increasing financial leverage beyond its established level, or issuing new external equity. The concept was initially developed by Higgins and is commonly expressed as a function of Return on Equity (ROE) and the earnings retention ratio. Within the sustainable growth framework, a firm's growth capacity depends on its ability to generate returns on shareholders' equity and retain a portion of those earnings for reinvestment. Accordingly, profitability and the capacity to generate internal financing constitute fundamental determinants of sustainable corporate growth (Isnurhadi et al., 2022; Ramli et al., 2022).

The SGR framework is particularly relevant to this study because ROE represents the firm's profitability generated from shareholders' capital, whereas SGR reflects the extent to which such profitability can support continued growth through internally generated resources. The theoretical relevance of ROE to SGR is supported by previous empirical studies. Altahtamouni et al. (2022) demonstrate that ROE and retained earnings significantly influence sustainable growth in the banking sector. Similarly, Moore & Simpson (2023) emphasize that ROE and the retention ratio

constitute fundamental components of alternative SGR measures and are relevant for estimating subsequent earnings growth.

Therefore, SGR provides an important financial indicator for assessing whether a firm's profitability and internal financing capacity are sufficient to support continued growth without excessive reliance on external financing. In this study, SGR is consequently positioned as an indicator of a firm's capacity to achieve financially sustainable growth.

Return on Equity

Return on Equity (ROE) measures a firm's ability to generate net income from shareholders' equity. From the perspective of sustainable growth theory, a higher ROE indicates greater efficiency in utilizing shareholders' capital to generate profits. When a firm retains a proportion of its earnings rather than distributing all profits as dividends, retained earnings become an important source of internal financing for asset expansion, investment, and business development. Consequently, higher profitability may strengthen the firm's capacity to sustain future growth (Altahtamouni et al., 2022b; Guliyev & Muzaffarov, 2024b).

The theoretical relationship between ROE and SGR is particularly strong because ROE is directly incorporated into the traditional SGR formulation. The basic Higgins model conceptualizes sustainable growth as the product of ROE and the earnings retention ratio. Thus, assuming other financial policies remain relatively stable, an increase in ROE should increase a firm's sustainable growth capacity. Empirical evidence is consistent with this theoretical relationship. Altahtamouni et al. (2022) find that ROE and retained earnings significantly affect SGR, while Moore & Simpson (2023) demonstrate the importance of ROE and retention ratios in estimating sustainable growth. From this perspective, firms with stronger profitability are expected to possess greater internally generated funds to finance expansion and, consequently, greater capacity for sustainable growth. Based on sustainable growth theory and the supporting empirical evidence, the following hypothesis is formulated:

H1: Return on Equity has a positive effect on Sustainable Growth Rate.

ESG Disclosure

Environmental, Social, and Governance (ESG) disclosure refers to information communicated by firms concerning their environmental, social, and governance practices, policies, and performance. ESG disclosure can be theoretically explained through signaling theory and legitimacy theory. Signaling theory suggests that firms use voluntary disclosure to reduce information asymmetry and communicate information concerning their quality, sustainability orientation, and future prospects to external

stakeholders (Del Gesso & Lodhi, 2025; Hummel & Schlick, 2016). Meanwhile, legitimacy theory argues that corporate disclosure can help firms demonstrate that their activities are consistent with broader societal expectations, thereby supporting the maintenance of organizational legitimacy.

Comprehensive ESG disclosure may contribute to sustainable growth through several interconnected mechanisms. First, greater transparency can reduce information asymmetry between firms and external stakeholders. Second, credible sustainability information may strengthen stakeholder trust and corporate reputation. Third, more transparent disclosure may facilitate access to external financing by reducing uncertainty regarding environmental, social, and governance risks (Anwar et al., 2026; Hussain & Zhou, 2026; Q. Ma, 2024). Collectively, these mechanisms may strengthen a firm's ability to maintain long-term growth.

Nevertheless, ESG disclosure does not necessarily generate immediate financial benefits. Disclosure activities may involve additional reporting, monitoring, and compliance costs, whereas the potential benefits associated with reputation, stakeholder trust, and improved access to capital may materialize over a longer period. Therefore, although ESG disclosure theoretically has the potential to support sustainable growth, its effect on SGR remains an empirical question, particularly in emerging-market contexts. Based on signaling theory, legitimacy theory, and the existing empirical evidence, the following hypothesis is formulated:

H2: ESG Disclosure has a positive effect on Sustainable Growth Rate.

Return on Equity and Green Innovation

Green innovation refers to the development and implementation of products, processes, technologies, or organizational practices that reduce environmental impacts while simultaneously generating economic value (Dias Angelo et al., 2012; Qin et al., 2026; Reischauer et al., 2025). The relationship between financial resources and green innovation can be explained through the Resource-Based View (RBV), which emphasizes the importance of valuable internal resources and organizational capabilities in creating and sustaining competitive advantage (Bulo et al., 2026; Khanra et al., 2022a). From this perspective, financial performance can provide firms with the resources necessary to undertake innovation activities, including environmental research and development, clean technologies, green product development, and environmentally oriented process improvements.

Firms with higher ROE generally possess stronger internal financial capacity and may therefore be better positioned to allocate resources to innovation activities (Moon, 2024; Perez-Alaniz et al., 2023). Green innovation frequently requires substantial initial investment, involves

technological uncertainty, and may be associated with relatively long payback periods (Chen et al., 2023; Holzner & Wagner, 2022). Firms with stronger profitability may have greater capacity to absorb these financial and technological risks and to finance green innovation without excessive dependence on external sources of financing.

The RBV literature identifies green innovation as a potentially valuable strategic resource and organizational capability that can contribute to competitive advantage and sustainable development. Khanra et al. (2022), through a systematic review of RBV literature on green innovation, emphasize the importance of understanding green innovation as an organizational resource and capability. From this perspective, firms with stronger financial resources are theoretically better equipped to develop and exploit green innovation capabilities. Accordingly, higher ROE is expected to provide greater financial flexibility for investments in environmentally oriented innovation. Therefore, the following hypothesis is formulated:

H3: Return on Equity has a positive effect on Green Innovation.

ESG Disclosure and Green Innovation

The relationship between ESG disclosure and green innovation can be explained through the integration of signaling theory, legitimacy theory, and the Resource-Based View. ESG disclosure communicates a firm's sustainability orientation to external stakeholders and may increase pressure from investors, regulators, customers, employees, and other stakeholders for substantive environmental action. Consequently, firms that disclose more extensive ESG information may have stronger incentives to develop green products, processes, and technologies in order to maintain consistency between their external commitments and actual organizational practices (Chandra Sekhar, 2026).

From an information asymmetry perspective, ESG disclosure can improve the availability and transparency of sustainability-related information. More comprehensive information may facilitate stakeholder monitoring, attract investor attention, and improve firms' access to resources required for innovation (Xiao, 2025). In this sense, ESG disclosure may function not merely as a reporting mechanism but also as an organizational mechanism that encourages firms to translate sustainability commitments into concrete innovation activities. Despite this qualification, the dominant theoretical expectation is that more extensive ESG disclosure creates stronger incentives and resources for firms to develop green innovation. Therefore, the following hypothesis is proposed:

H4: ESG Disclosure has a positive effect on Green Innovation.

Green Innovation and Sustainable Growth Rate

The relationship between green innovation and sustainable growth can be explained primarily through the Resource-Based View and the Porter Hypothesis. Under RBV, green innovation can become a valuable organizational capability that enables firms to develop differentiated products, improve resource efficiency, reduce environmental costs, and create competitive advantages. Such capabilities may contribute to stronger long-term economic performance and sustainable growth (Abdelali charkaoui, 2024; Bulo et al., 2026b).

The Porter Hypothesis provides a complementary argument. Appropriate environmental innovation can encourage firms to improve production efficiency and develop new technologies that offset some of the costs associated with environmental regulation. Consequently, environmental innovation may generate both ecological and economic benefits. Green innovation is expected to enhance the firm's long-term growth capacity by improving efficiency, developing new products, and strengthening competitive advantage. However, the extent to which these benefits translate into sustainable growth depends on the firm's ability to absorb the substantial costs and risks associated with innovation. Therefore, the following hypothesis is proposed:

H5: Green Innovation has a positive effect on Sustainable Growth Rate.

The Mediating Role of Green Innovation in the Relationship between Return on Equity and Sustainable Growth Rate

Green innovation may function as a mechanism through which financial resources are transformed into sustainable growth capabilities (Hu et al., 2021). The RBV provides the theoretical foundation for this mediation relationship. According to RBV, financial resources alone do not automatically create competitive advantage; firms must convert available resources into valuable organizational capabilities and innovations.

ROE reflects the firm's capacity to generate returns from shareholders' capital. Firms with stronger profitability may have greater financial resources that can be allocated to R&D, cleaner technologies, environmentally friendly production processes, and green product development. Green innovation can then transform these financial resources into new capabilities, operational efficiencies, and competitive advantages that potentially support sustainable growth (Astuti & Ahmar, 2025; Galloppo et al., 2026; Wu et al., 2026). This mechanism implies that ROE may influence SGR not only through its direct contribution to internal financing capacity but also indirectly by enabling firms to invest in green innovation. The indirect pathway can therefore be conceptualized as ROE → Green Innovation → SGR.

Although previous research has examined financial performance, innovation, and sustainability outcomes separately, evidence regarding the

specific mediating role of green innovation between ROE and SGR remains limited. This gap is particularly relevant in emerging markets, where financial constraints and the high costs of green technologies may influence the ability of firms to transform profitability into sustainability-oriented innovation. Therefore, the following hypothesis is proposed:

H6: Green Innovation mediates the relationship between Return on Equity and Sustainable Growth Rate.

The Mediating Role of Green Innovation in the Relationship between ESG Disclosure and Sustainable Growth Rate

ESG disclosure may also influence sustainable growth indirectly through green innovation. Signaling and legitimacy theories suggest that ESG disclosure communicates the firm's sustainability commitments to stakeholders and creates expectations regarding actual sustainability practices (M. Li & Rasiah, 2024; Lin et al., 2026; Ruan et al., 2024b; N. Wang et al., 2022). When firms disclose extensive ESG information, stakeholders may demand consistency between reported commitments and organizational actions. Green innovation can represent one mechanism through which firms respond to these expectations (Hang et al., 2023; Yang & Chen, 2025; Zhai et al., 2022).

From the RBV perspective, ESG disclosure can contribute to the development of organizational capabilities by improving access to information, stakeholder resources, financing, and knowledge (Adhikara et al., 2025; Ooi, 2026). These resources may facilitate the development of green products and processes. Green innovation may subsequently contribute to sustainable growth by improving operational efficiency, reducing environmental risks, strengthening competitiveness, and opening new market opportunities (Maistrenko et al., 2026; Y. Zhang et al., 2020). Accordingly, the proposed mediation mechanism is ESG Disclosure → Green Innovation → Sustainable Growth Rate. Based on the integration of signaling theory, legitimacy theory, and RBV, the following hypothesis is proposed:

H7: Green Innovation mediates the relationship between ESG Disclosure and Sustainable Growth Rate.

RESEARCH METHOD

This study employs panel-data regression to examine the relationships among Return on Equity (ROE), ESG Disclosure (ESGD), Green Innovation (GI), and Sustainable Growth Rate (SGR). The panel dataset consists of 34 non-financial companies observed annually from 2021 to 2025, resulting in 170 firm-year observations. Panel data are appropriate because they combine cross-sectional and time-series dimensions and allow the analysis to account for unobserved firm-specific heterogeneity (Wooldridge, 2010).

The empirical analysis consists of three regression models corresponding to the proposed mediation framework.

Model 1: The Effect of ROE and ESG Disclosure on SGR

$$SGR_{it} = \alpha + c_1 ROE_{it} + c_2 ESGD_{it} + \mu_i + \varepsilon_{it} \quad 1$$

where SGR_{it} represents the Sustainable Growth Rate of firm i in year t , ROE_{it} represents Return on Equity, $ESGD_{it}$ represents ESG Disclosure, μ_i represents firm-specific effects, and ε_{it} represents the error term. The coefficients c_1 and c_2 represent the effects of ROE and ESG Disclosure on SGR, respectively. This model is used to test H1 and H2.

Model 2: The Effect of ROE and ESG Disclosure on Green Innovation

$$GI_{it} = \alpha + a_1 ROE_{it} + a_2 ESGD_{it} + \mu_i + \varepsilon_{it} \quad 2$$

where GI_{it} represents Green Innovation. The coefficient a_1 represents the effect of ROE on Green Innovation, while a_2 represents the effect of ESG Disclosure on Green Innovation. This model is used to test H3 and H4.

Model 3: The Effect of ROE, ESG Disclosure, and Green Innovation on SGR

$$SGR_{it} = \alpha + c'_1 ROE_{it} + c'_2 ESGD_{it} + b GI_{it} + \mu_i + \varepsilon_{it}$$

where c'_1 represents the direct effect of ROE on SGR after controlling for Green Innovation, c'_2 represents the direct effect of ESG Disclosure on SGR after controlling for Green Innovation, and b represents the effect of Green Innovation on SGR. This model is used to test H5 and provides the coefficients required to examine H6 and H7.

The indirect effect of ROE on SGR through Green Innovation is calculated as:

$$IndirectROE = a_1 \times b \quad 3$$

Meanwhile, the indirect effect of ESG Disclosure on SGR through Green Innovation is calculated as:

$$IndirectESGD = a_2 \times b \quad 4$$

FINDINGS AND DISCUSSION

Descriptive Statistics

The study examines the relationships between Return on Equity (ROE), ESG Disclosure (ESGD), Green Innovation (GI), and Sustainable Growth Rate (SGR) using panel data from 34 companies observed over the 2021-2025 period. The final balanced panel consists of 170 firm-year observations. Descriptive statistics are presented to provide an overview of the distribution and characteristics of the variables used in the empirical analysis.

Table 1.

Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
SGR	170	0.24796	0.36192	-0.67388	2.32176
ROE	170	0.15646	0.18899	-0.75213	1.24660

ESGD	170	0.91513	0.12329	0.35714	1.00000
GI	170	0.70294	0.21022	0.20000	1.00000

Source: Author(s) work

Table 1 shows that the mean SGR is 0.24796, indicating an average sustainable growth rate of approximately 24.80%. However, the relatively large standard deviation of 0.36192 indicates substantial variation in sustainable growth among the maximum reaches 2.32176. The negative values indicate that some firm-year observations experienced negative sustainable growth during the observation period.

The mean ROE is 0.15646, or approximately 15.65%, with values ranging from -0.75213 to 1.24660. This variation indicates considerable differences in the ability of companies to generate returns from shareholders' equity. ESG Disclosure has a relatively high mean value of 0.91513, indicating that the companies disclose approximately 91.51% of the assessed ESG disclosure items on average. Meanwhile, Green Innovation has a mean value of 0.70294, with observations ranging from 0.20 to 1.00.

The relatively high average ESG Disclosure does not necessarily imply that the disclosed information is translated into higher levels of Green Innovation. This distinction is important because ESG Disclosure measures the extent of information disclosure, whereas Green Innovation captures the innovation dimension related to environmental practices.

Panel Regression Results

Before estimating the mediation model, the appropriate panel-data specification was determined for each structural equation. The first model estimates the effects of ROE and ESG Disclosure on SGR. The second model examines the effects of ROE and ESG Disclosure on Green Innovation. The third model estimates the effects of ROE, ESG Disclosure, and Green Innovation on SGR.

The model-selection procedure indicated that the first model was estimated using the Fixed Effects (FE) approach, while the third model was estimated using the Random Effects (RE) approach. For the second model, the FE specification was retained based on the Mundlak/Correlated Random Effects assessment after the conventional Hausman test produced a non-positive chi-square statistic. The final estimations use cluster-robust standard errors at the company level to address groupwise heteroskedasticity.

Table 2.

Panel Regression Results

Variables	Model 1: SGR (FE)	Model 2: GI (FE)	Model 3: SGR (RE)
ROE	1.1244* (0.1815)	-0.0143 (0.1074)	1.1995* (0.2137)
ESGD	0.0861	-0.0266	0.0898

	(0.0629)	(0.1169)	(0.0585)
GI			-0.0979
			(0.1295)
Constant	-0.0067	0.7296*	0.0470
	(0.0428)	(0.1140)	(0.0756)
Observations	170	170	170
Companies	34	34	34
Within R ²	0.5262	0.0011	0.5256
F/Wald statistic	51.38***	0.03	55.54***
Estimator	FE	FE	RE

Note: Robust standard errors clustered by company are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10. Source: Author(s) work.

As presented in Table 2, Model 1 is statistically significant overall ($F = 51.38$; $p < 0.001$), with a within R^2 of 0.5262. ROE has a positive and statistically significant coefficient of 1.1244 ($p < 0.001$), whereas ESG Disclosure has a positive but statistically insignificant coefficient of 0.0861 ($p = 0.181$).

Model 2 shows that the explanatory variables do not significantly explain within-company variation in Green Innovation. The model has a very low within R^2 of 0.0011, and the overall F-test is statistically insignificant ($p = 0.9728$). ROE has a coefficient of -0.0143 ($p = 0.895$), while ESG Disclosure has a coefficient of -0.0266 ($p = 0.821$).

Model 3, the overall model is statistically significant (Wald $\chi^2 = 55.54$; $p < 0.001$), with a within R^2 of 0.5256. ROE remains positive and statistically significant ($\beta = 1.1995$; $p < 0.001$). ESG Disclosure is positive but statistically insignificant ($\beta = 0.0898$; $p = 0.125$). Green Innovation has a negative coefficient (-0.0979), but this coefficient is not statistically significant ($p = 0.449$).

Mediation Analysis

The mediation analysis evaluates whether Green Innovation transmits the effects of ROE and ESG Disclosure on SGR. The indirect effects were calculated as the product of the coefficient of the independent variable on Green Innovation and the coefficient of Green Innovation on SGR. The significance of the indirect effects was assessed using 2,000 cluster-bootstrap replications.

Table 3.
Bootstrap Mediation Results

Mediation Path	Indirect Effect	Percentile 95% CI	Bias-Corrected 95% CI	Decision
ROE $\square$ GI $\square$ SGR	0.001405	[-0.052903; 0.013781]	[-0.007982; 0.050612]	Not supported

ESGD $\square$ GI $\square$	0.002609	[-0.028457; 0.056669]	[-0.017031; 0.080932]	Not supported
SGR				

Note: 2,000 cluster-bootstrap replications. The indirect effect is considered statistically significant when the bootstrap confidence interval does not contain zero. Source: Author(s) work.

The indirect effect of ROE on SGR through GI is 0.001405. However, both the percentile confidence interval and the bias-corrected confidence interval contain zero. Therefore, there is insufficient statistical evidence that GI mediates the relationship between ROE and SGR.

Similarly, the indirect effect of ESG Disclosure on SGR through GI is 0.002609. The percentile confidence interval ranges from -0.028457 to 0.056669, while the bias-corrected interval ranges from -0.017031 to 0.080932. Both intervals contain zero, indicating that the indirect effect is not statistically significant.

Discussion

The Effect of ROE on Sustainable Growth Rate

The results demonstrate that ROE has a positive and statistically significant effect on Sustainable Growth Rate. The coefficient of 1.1244 in the Fixed Effects model indicates that variations in firms' profitability relative to shareholders' equity are positively associated with variations in sustainable growth.

This finding is consistent with the financial logic underlying sustainable growth. Firms that generate higher returns on shareholders' equity have greater internal capacity to support expansion without relying excessively on external financing. Higher profitability can increase retained earnings and consequently strengthen the firm's ability to finance future growth. From the perspective of sustainable growth theory, profitability is therefore an important internal determinant of the growth that a firm can sustain through internally generated resources (Guliyev & Muzaffarov, 2024c; Syahfrizal & Shaferi, 2026).

The finding also indicates that financial performance has a more observable relationship with sustainable growth than the disclosure and innovation variables examined in this study. In the context of the observed companies during 2021–2025, ROE appears to capture a direct financial mechanism associated with SGR.

The Effect of ESG Disclosure on Sustainable Growth Rate

ESG Disclosure has a positive coefficient in both SGR models, but the effect is not statistically significant. This finding indicates that a higher level

of ESG disclosure is not necessarily accompanied by a statistically detectable increase in sustainable growth within the observed sample.

One possible interpretation is that disclosure and economic realization are distinct processes. ESG disclosure primarily represents the extent to which companies communicate environmental, social, and governance information to stakeholders. Disclosure itself does not necessarily generate immediate financial resources or directly increase the firm's capacity to sustain growth.

The result is also relevant to the distinction between ESG disclosure and ESG performance. A company may provide extensive ESG information while the economic consequences of those activities are realized only over a longer period. Therefore, the absence of a significant short-term relationship between ESG Disclosure and SGR should not be interpreted as evidence that ESG-related activities have no economic relevance (Bancu, 2024; Charoenroop et al., 2026). Rather, the finding suggests that the disclosure measure used in this study does not statistically explain within-sample variation in SGR over the 2021–2025 observation period.

The Effect of ROE on Green Innovation

The results show that ROE does not have a statistically significant effect on Green Innovation. The coefficient is negative (-0.0143), with a p-value of 0.895.

This finding suggests that differences in financial profitability do not automatically translate into observable differences in green innovation among the companies in the sample. Green innovation may require specific organizational capabilities, technological investment, environmental strategies, and managerial commitment rather than being determined solely by financial profitability (Cheng & Tianzeng, 2024; Riehl et al., 2022).

The finding also indicates that financially successful firms do not necessarily allocate their additional financial capacity to environmental innovation. The allocation of resources may depend on strategic priorities, technological opportunities, regulatory requirements, industry characteristics, and the expected return from environmental investments.

The Effect of ESG Disclosure on Green Innovation

ESG Disclosure also does not have a statistically significant effect on Green Innovation. The coefficient is -0.0266, with a p-value of 0.821.

This result highlights the distinction between communicating ESG activities and actually implementing innovation. A high level of ESG disclosure may reflect greater transparency and reporting practices, but it does not necessarily indicate that the company has developed new environmentally

oriented products, processes, technologies, or organizational practices (Essajide et al., 2025; M. Li & Gan, 2026).

The descriptive statistics provide an interesting context for this finding. ESG Disclosure has a high average value of 91.51%, while Green Innovation has an average value of 70.29%. Nevertheless, the panel estimation indicates that changes in ESG disclosure within firms do not significantly explain changes in Green Innovation. This suggests that disclosure intensity and innovation activity may operate through different organizational mechanisms.

The Effect of Green Innovation on Sustainable Growth Rate

Green Innovation has a negative coefficient of -0.0979 in Model 3, but the effect is statistically insignificant ($p = 0.449$). Therefore, the data do not provide sufficient evidence that Green Innovation affects Sustainable Growth Rate during the observation period.

One possible explanation is the time horizon required for green innovation investments to generate economic returns. Environmental innovation can involve substantial initial expenditure for research and development, cleaner production technologies, process modification, employee capabilities, and organizational transformation. The financial benefits associated with these investments may not be immediately reflected in sustainable growth (Rezende et al., 2019; Tutar & Štreimikienė, 2026).

The insignificant result may also reflect heterogeneity in the economic consequences of green innovation across firms and industries. Green innovation can produce cost savings or market opportunities in some contexts, while in other contexts it may initially increase investment requirements. Therefore, the aggregate relationship between GI and SGR may not be statistically detectable over a relatively limited five-year observation period.

The Mediating Role of Green Innovation

The mediation analysis provides no statistical evidence that Green Innovation mediates either the relationship between ROE and SGR or the relationship between ESG Disclosure and SGR.

For the ROE pathway, the indirect effect is 0.001405, while the bias-corrected 95% bootstrap confidence interval ranges from -0.007982 to 0.050612. Because the interval contains zero, the indirect effect is not statistically significant.

For the ESG Disclosure pathway, the indirect effect is 0.002609, with a bias-corrected 95% confidence interval ranging from -0.017031 to 0.080932. Again, the interval contains zero, indicating that the indirect effect is not statistically significant.

These results are consistent with the individual structural paths. Neither ROE nor ESG Disclosure significantly predicts Green Innovation, and Green Innovation does not significantly predict SGR. Consequently, the proposed mechanism in which financial performance or ESG disclosure is translated into sustainable growth through green innovation is not supported by the empirical evidence from the sample (Khanchel et al., 2023; Machmuddah et al., 2025a).

Importantly, the absence of mediation should be interpreted within the specific research setting. It does not establish that Green Innovation can never function as a mediator. Instead, the finding indicates that the proposed indirect mechanism is not statistically supported for the companies, variables, measurement approaches, and 2021–2025 period examined in this study.

CONCLUSIONS

This study examined the effects of Return on Equity and ESG Disclosure on Sustainable Growth Rate and investigated whether Green Innovation functions as a mediating mechanism using panel data from 34 companies during 2021–2025.

The findings indicate that ROE has a positive and statistically significant relationship with Sustainable Growth Rate. This result suggests that financial profitability is directly associated with firms' capacity to achieve sustainable growth (Guliyev & Muzaffarov, 2024d; Moore & Simpson, 2023b). In contrast, ESG Disclosure does not show a statistically significant relationship with SGR (Almeyda & Darmansyah, 2019; Manita et al., 2018). The results further indicate that neither ROE nor ESG Disclosure significantly explains Green Innovation, while Green Innovation itself does not have a statistically significant relationship with Sustainable Growth Rate (Machmuddah et al., 2025b; Ruan et al., 2024c).

The bootstrap mediation analysis provides no statistical evidence that Green Innovation mediates the relationship between ROE and Sustainable Growth Rate or between ESG Disclosure and Sustainable Growth Rate. Thus, the empirical evidence supports a direct relationship between ROE and SGR but does not support the proposed indirect mechanisms through Green Innovation.

From a managerial perspective, the findings suggest that companies should distinguish between financial performance, ESG communication, and actual innovation outcomes. Improving disclosure practices alone does not necessarily translate into measurable improvements in green innovation or sustainable growth. Firms seeking to strengthen sustainable growth may therefore need to consider how ESG commitments are translated into concrete innovation activities and economically productive investments.

This study has several limitations. First, the observation period covers only five years, which may be relatively short for capturing the financial consequences of green innovation. Second, ESG Disclosure and Green Innovation are operationalized through measurement indicators that may not fully capture the quality, intensity, or economic impact of the underlying activities. Third, the study focuses on a specific sample of companies, limiting the generalizability of the findings to other firms, industries, or periods.

Future research could extend the observation period, incorporate additional measures of Green Innovation and ESG performance, and examine potential moderating factors such as environmental regulation, technological capability, firm size, industry characteristics, or environmental uncertainty. Future studies may also investigate whether green innovation produces delayed effects on sustainable growth by incorporating appropriate time lags into the mediation model.

LIMITATION & FURTHER RESEARCH

The limitations of the study are those characteristics of design or methodology that impacted or influenced the interpretation of the findings from your research. Further research should suggest the number of gaps in our knowledge that follow from our findings or to extend and further test of the research.

AUTHOR CONTRIBUTION

Author: Conceptualisation and Research Design, Data Collection, Methodology, Supervision, Writing Entire Paper, Conceptualisation, Data Collection and Analysis, Editing and Layouting. All Authors have read the final version of the paper.

Declaration of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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