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Environmental, social, and governance pressure and green innovation investment: the mediating role of managerial sustainability orientation and the moderating role of corporate governance quality

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ABSTRACT

This study investigated the effect of Environmental, Social, and Governance (ESG) pressure on green innovation investment, with particular attention to the mediating role of managerial sustainability orientation and the moderating role of corporate governance quality. The study drew on stakeholder theory, legitimacy theory, institutional theory, and the resource-based view to better understand how ESG-related pressures influence sustainability-oriented investment behavior. The study used a quantitative research design using survey data collected from 372 managerial professionals working in environmentally sensitive and innovation-intensive industries. The data were analyzed through correlation analysis, multiple regression analysis, and Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings showed that ESG pressure has a significant positive effect on green innovation investment. Managerial sustainability orientation partially mediated the relationship between ESG pressure and green innovation investment, while corporate governance quality significantly strengthened this relationship. The results also confirmed satisfactory reliability, validity, and predictive relevance of the proposed model. The findings suggest that firms with strong sustainability-oriented managerial commitment and effective governance mechanisms are more capable of converting ESG-related pressures into sustainable innovation strategies and long-term competitive advantage.

Keywords: Corporate governance quality; ESG pressure; Green innovation investment; Institutional theory; Managerial sustainability orientation.



INTRODUCTION

Environmental sustainability has become a major strategic concern for corporations due to increasing climate change risks, environmental degradation, carbon emissions, and global stakeholder expectations regarding responsible business conduct (Bektas, 2025; Emmanuel, 2025). Governments, investors, customers, and regulators now expect firms to include ESG practices in business decisions (Ghosh & Bohra, 2025; Sharma et al., 2022). As a result, firms face increasing pressure to demonstrate environmental accountability, transparency, and long-term sustainability performance (Farhana et al., 2025).

Among the main strategic response to ESG-related pressures, green innovation investment has become particularly important. Green innovation includes sustainable products, technologies, digital transformation, process innovation, supply chain agility, and practices that reduce environmental harm and improve long-term competitiveness (Zhang et al., 2024; Yarkarami, 2025). Green innovation investments commonly include renewable energy adoption, clean technologies, sustainable manufacturing systems, green research and development (R&D), emission reduction technologies, and environmentally responsible supply chain practices (Lin et al., 2024; Ahmed et al., 2026).

Although ESG initiatives are often associated with compliance and reputational management, ESG pressure can also motivate firms to invest in sustainable innovation (Widyantoro et al., 2025; Xing et al., 2025). Firms under stronger ESG pressure often invest in green innovation to improve reputation, reduce risks, and strengthen long-term competitiveness (Gao & Zhao, 2026; Minghao et al., 2026). However, previous studies report mixed findings regarding the relationship between ESG pressure and innovation investment. Some studies suggest that ESG pressure promotes sustainable innovation and long-term competitiveness (Xiao, 2024; Putra et al., 2025), whereas others argue that excessive ESG compliance requirements may increase operational costs, create managerial constraints, and discourage risky innovation activities (Xing et al., 2025).

This study addresses this gap by examining how ESG pressure influences managerial green innovation investment decisions in environmentally sensitive industries. In contrast to prior research focusing mainly on ESG disclosure or financial performance outcomes, this study specifically examines the investment mechanisms through which ESG-related pressures translate into environmentally sustainable innovation behavior.

The study combines stakeholder, legitimacy, institutional, and resource-based theories into one framework. Stakeholder theory posits that organizations respond to stakeholder expectations to secure organizational legitimacy and long-term survival (Freeman, 1984). Legitimacy theory suggests that firms adopt environmentally responsible practices to align organizational activities with societal norms and expectations (Suchman, 1995). Institutional theory further explains how coercive, normative, and mimetic pressures influence organizational behavior and strategic adaptation (DiMaggio & Powell, 1983). Meanwhile, the resource-based view argues that organizational resources and capabilities, including green innovation capability, can generate sustainable competitive advantage when they are valuable, rare, inimitable, and non-substitutable (Barney, 1991).



This study contributes in several ways. First, it develops a theoretically integrated framework explaining how ESG pressure influences green innovation investment through managerial sustainability orientation and governance quality. Second, it distinguishes between compliance-driven and strategic ESG responses by examining how managerial commitment converts external pressure into proactive innovative activities. Third, the study contributes empirical evidence from environmentally sensitive industries in emerging market contexts where ESG expectations are rapidly increasing although sustainability capabilities still vary considerably.

The study examines how ESG pressure influences firms' investment in green technologies and sustainable innovation. In addition, the study investigates the mediating role of managerial sustainability orientation to understand how managerial commitment to sustainability translates ESG-related pressures into strategic green investment decisions. The research further explores the moderating role of corporate governance quality in strengthening the relationship between ESG pressure and green innovation investment through stronger oversight, transparency, and accountability. Finally, the study evaluates the strategic implications of ESG-driven innovation investment for enhancing long-term organizational sustainability, competitive advantage, and corporate resilience in increasingly sustainability-oriented business environments.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

ESG Pressure and Green Innovation Investment

Environmental, Social, and Governance (ESG) pressure has become an important strategic issue for organizations operating in environmentally sensitive and innovation-intensive industries. Increasing expectations from regulators, investors, customers, environmental groups, and broader societal stakeholders have pushed firms to integrate sustainability considerations into strategic decision-making and investment activities (Cannizzaro et al., 2026; Emmanuel, 2025). Rising regulatory scrutiny, sustainability reporting standards, carbon disclosure requirements, and responsible investment frameworks have further intensified pressure on firms to adopt environmentally sustainable business practices (Ghosh & Bohra, 2025; Sharma et al., 2022). Green innovation investment includes spending on green technologies, renewable energy, and sustainable operations. Such investments not only improve environmental performance and support regulatory compliance but also contribute to long-term organizational resilience, operational efficiency, and strategic differentiation.

Several theoretical perspectives explain why ESG pressure may influence green innovation investment. Stakeholder theory argues that firms respond strategically to stakeholder expectations in order to maintain legitimacy, reputation, and long-term organizational survival (Freeman, 1984). Investors increasingly evaluate firms based on ESG performance, while consumers and civil society organizations expect corporations to demonstrate environmental accountability (Farhana et al., 2025; Nophet & Sincharoonsak, 2025). Consequently, firms experiencing stronger ESG pressure are more likely to invest in environmentally sustainable technologies and green innovation initiatives to preserve stakeholder trust and market legitimacy (Widyantoro et al., 2025).



Legitimacy theory further explains that organizations seek alignment between corporate actions and societal expectations (Suchman, 1995). Firms operating in environmentally sensitive industries often face heightened scrutiny regarding environmental impacts, carbon emissions, and sustainability performance. Green innovation investment therefore functions as a legitimacy-enhancing mechanism through which firms demonstrate environmental responsibility and commitment toward sustainable development (Gouda et al., 2025; Hamoudah, 2025).

Institutional theory further explains by distinguishing among coercive, normative, and mimetic pressures (DiMaggio & Powell, 1983). Coercive pressures originate from government regulations, environmental laws, and mandatory ESG disclosure requirements. Normative pressures arise from professional standards, stakeholder expectations, and industry sustainability norms, whereas mimetic pressures occur when firms imitate competitors adopting successful sustainability-oriented practices. These institutional forces collectively encourage organizations to integrate ESG considerations into strategic investment and innovation decisions (Cannizzaro et al., 2026; Ahmed et al., 2026).

From the resource-based view (RBV), green innovation capability can become a valuable, rare, and difficult-to-imitate strategic resource that contributes to sustainable competitive advantage (Barney, 1991). Firms investing in environmentally sustainable technologies may achieve enhanced operational efficiency, stronger stakeholder relationships, improved corporate reputation, and long-term competitive positioning (Vuong & Bui, 2026; Zhang et al., 2024).

However, previous findings remain inconsistent. Some studies suggest that ESG pressure stimulates innovation investment and sustainability-oriented strategic behavior (Wang et al., 2026; Widyanoro et al., 2025), whereas others argue that excessive ESG compliance requirements may increase operational costs and discourage managerial willingness to undertake uncertain innovation projects (Xiao, 2024; Xing et al., 2025). These inconsistencies indicate the need to further examine the organizational mechanisms through which ESG pressure influences green innovation investment.

Managerial Sustainability Orientation

Managerial sustainability orientation refers to the extent to which organizational leaders prioritize environmental sustainability within strategic planning and decision-making processes. Sustainability-oriented managers are more likely to perceive ESG-related pressures as opportunities for innovation, reputation enhancement, and long-term value creation rather than merely compliance obligations (Putra et al., 2025; Ding et al., 2025).

Managerial sustainability orientation may therefore serve as an important mediating factor between ESG pressure and green innovation investment. External ESG pressures alone may not automatically translate into sustainability-oriented investment behavior unless managers internalize environmental priorities within organizational strategy. Managers possessing stronger sustainability commitment are more likely to allocate resources toward green technologies, renewable energy initiatives, sustainable production systems, and environmentally responsible R&D activities (Minghao et al., 2026; Chua, 2025). Consequently, managerial sustainability orientation may explain how external ESG expectations are transformed into proactive green investment decisions.



Corporate Governance Quality

Corporate governance quality reflects the effectiveness of governance structures, board oversight, accountability mechanisms, transparency systems, and sustainability monitoring processes within organizations (Gao & Zhao, 2026). Effective governance mechanisms play an important role in aligning organizational sustainability objectives with strategic investment decisions and long-term corporate accountability (Ding et al., 2025). Corporate governance quality may also strengthen the relationship between ESG pressure and green innovation investment. Firms with independent boards, ESG committees, sustainability oversight systems, and transparent governance structures are generally better positioned to respond proactively to ESG-related stakeholder expectations and sustainability challenges (Wang et al., 2026; Hamoudah, 2025). Strong governance systems improve monitoring effectiveness, reduce managerial opportunism, and support long-term sustainability planning, thereby enhancing firms' capacity to translate ESG pressure into environmentally sustainable innovation initiatives.

Although increasing scholarly attention has examined ESG and sustainability management, prior studies have frequently examined ESG pressure, governance quality, and innovation performance independently rather than integrating these constructs within a unified explanatory framework. In addition, limited research has simultaneously examined the mediating role of managerial sustainability orientation and the moderating role of corporate governance quality in shaping ESG-driven green innovation investment, particularly within environmentally sensitive and emerging economy contexts. Accordingly, the present study develops and tests an integrated framework explaining how ESG pressure influences green innovation investment through managerial sustainability orientation and corporate governance quality. By integrating stakeholder theory, legitimacy theory, institutional theory, and the resource-based view, the study contributes to the growing literature on sustainability management, green innovation, and corporate governance.

ESG Pressure and Green Innovation Investment

Environmental, Social, and Governance (ESG) pressure has increasingly become a significant driver of organizational sustainability-oriented strategic behavior. Firms operating in environmentally sensitive industries face growing scrutiny from regulators, investors, customers, environmental organizations, and broader societal stakeholders regarding environmental performance, carbon emissions, sustainability reporting, and responsible business practices (Cannizzaro et al., 2026; Emmanuel, 2025). As sustainability expectations intensify, organizations are compelled to integrate ESG considerations into their strategic planning and investment activities. Green innovation investment, including investments in environmentally sustainable technologies, green research and development, renewable energy systems, and eco-friendly production processes, has therefore emerged as an important mechanism through which firms respond to ESG-related expectations while enhancing long-term competitiveness and legitimacy. Stakeholder theory suggests that firms strategically respond to stakeholder demands in order to preserve organizational legitimacy, reputation, and long-term survival (Freeman, 1984). Similarly, legitimacy theory argues that organizations seek alignment between corporate actions and societal expectations to maintain public approval and social acceptance (Suchman, 1995). Institutional theory further explains that coercive pressures from regulations, normative pressures from



sustainability standards, and mimetic pressures arising from competitive imitation collectively encourage firms to adopt environmentally sustainable innovation strategies (DiMaggio & Powell, 1983). Prior studies have reported that ESG pressure positively influences organizational sustainability investment and green innovation activities by encouraging firms to improve operational efficiency, reduce environmental risks, and strengthen stakeholder trust (Wang et al., 2026; Widyantoro et al., 2025). Based on these arguments, the study proposes:

H1: ESG pressure positively affects green innovation investment.

ESG Pressure and Managerial Sustainability Orientation

ESG-related stakeholder expectations may significantly influence managerial attitudes, strategic priorities, and sustainability-oriented decision-making behavior within organizations. Managers operating under strong ESG scrutiny are increasingly expected to integrate environmental sustainability considerations into organizational strategy, operational planning, and investment decisions. ESG-related regulations, stakeholder activism, sustainability disclosure requirements, and investor expectations may encourage managers to recognize sustainability not only as a compliance obligation but also as a strategic opportunity for innovation, reputation enhancement, and long-term value creation (Putra et al., 2025; Ding et al., 2025).

From a stakeholder and institutional perspective, managerial responses to ESG pressure are shaped by external expectations regarding environmental responsibility and corporate accountability. Managers exposed to stronger ESG-related pressures are more likely to develop sustainability-oriented strategic perspectives and support environmentally responsible organizational practices. Sustainability-oriented managers tend to prioritize long-term environmental objectives, encourage green innovation initiatives, and allocate resources toward sustainable operational systems and technologies (Minghao et al., 2026; Chua, 2025). Existing studies further indicate that external sustainability pressures can reshape managerial cognition and strategic orientation by increasing awareness regarding environmental risks, stakeholder expectations, and sustainability-related competitive advantages (Farhana et al., 2025; Gao & Zhao, 2026). Therefore,

H2: ESG pressure positively influences managerial sustainability orientation.

Mediating Role of Managerial Sustainability Orientation

Although ESG pressure may encourage organizations to adopt sustainability-oriented practices, external pressures alone may not automatically translate into proactive green innovation investment decisions. The strategic interpretation of ESG-related expectations by organizational leaders plays an important role in determining how firms respond to sustainability challenges and opportunities. Managerial sustainability orientation therefore represents a critical organizational mechanism through which ESG pressure can influence environmentally sustainable investment behavior. Managers with strong sustainability commitment are more likely to integrate environmental priorities into strategic planning and support long-term investments in green technologies, sustainable production systems, and environmentally responsible innovation initiatives.

The mediating role of managerial sustainability orientation is supported by strategic management and organizational behavior perspectives emphasizing the importance of managerial cognition and



leadership orientation in shaping organizational responses to external institutional pressures. Sustainability-oriented managers are more likely to perceive ESG-related expectations as opportunities for innovation capability development, stakeholder trust enhancement, and long-term competitive positioning rather than as short-term regulatory burdens (Putra et al., 2025; Ding et al., 2025). Prior research suggests that managerial sustainability commitment significantly influences organizational green investment decisions and environmental innovation adoption (Chua, 2025; Minghao et al., 2026). Thus, ESG pressure may indirectly influence green innovation investment through its impact on managerial sustainability orientation. Therefore,

H3: Managerial sustainability orientation mediates the relationship between ESG pressure and green innovation investment.

Moderating Role of Corporate Governance Quality

Corporate governance quality plays an important role in shaping organizational responsiveness to ESG-related pressures and sustainability-oriented strategic initiatives. Governance quality reflects the effectiveness of board oversight, accountability mechanisms, transparency systems, sustainability monitoring processes, and strategic control structures within organizations (Gao & Zhao, 2026). Firms with strong governance systems are generally better positioned to align sustainability objectives with strategic investment decisions and long-term organizational goals. Effective governance mechanisms may therefore strengthen firms' ability to translate ESG-related stakeholder expectations into proactive green innovation investment behavior.

Institutional and governance perspectives suggest that organizations with stronger governance quality are more capable of managing sustainability risks, monitoring ESG performance, and ensuring accountability regarding environmental objectives. Independent boards, sustainability committees, transparent governance practices, and effective oversight systems can improve managerial commitment toward sustainability-oriented innovation and reduce short-term opportunistic behavior (Ding et al., 2025; Hamoudah, 2025). Previous studies further indicate that firms with stronger governance mechanisms demonstrate greater responsiveness to ESG disclosure requirements and sustainability-related stakeholder expectations (Wang et al., 2026; Gao & Zhao, 2026). Consequently, governance quality may enhance the positive effect of ESG pressure on green innovation investment by strengthening organizational sustainability oversight and strategic alignment. Therefore, the following hypothesis is proposed:

H4: Corporate governance quality positively moderates the relationship between ESG pressure and green innovation investment.

CONCEPTUAL FRAMEWORK

Figure 1 presents the theoretically grounded conceptual framework developed to explain how ESG-related external pressures influence organizational green innovation investment behavior. The framework is constructed by integrating stakeholder theory, legitimacy theory, institutional theory, and the resource-based view (RBV) to provide a clearer explanation of the relationships among the study variables.

The framework identifies ESG pressure as the primary independent variable arising from investors, regulators, consumers, environmental groups, and broader societal expectations. From a stakeholder theory perspective, firms respond strategically to stakeholder demands in order to maintain legitimacy, strengthen stakeholder relationships, and ensure long-term organizational survival (Freeman, 1984). Legitimacy theory further explains that organizations adopt environmentally responsible practices to align corporate activities with prevailing societal norms and expectations (Suchman, 1995). Institutional theory additionally supports this relationship by explaining how coercive pressures from regulations, normative pressures from professional standards, and mimetic pressures from competitive imitation collectively encourage firms to adopt sustainability-oriented strategies and invest in environmentally responsible innovation activities (DiMaggio & Powell, 1983). Consequently, stronger ESG pressure is expected to motivate firms to invest more resources in green technologies, sustainable production systems, green R&D, and environmentally sustainable innovation initiatives.

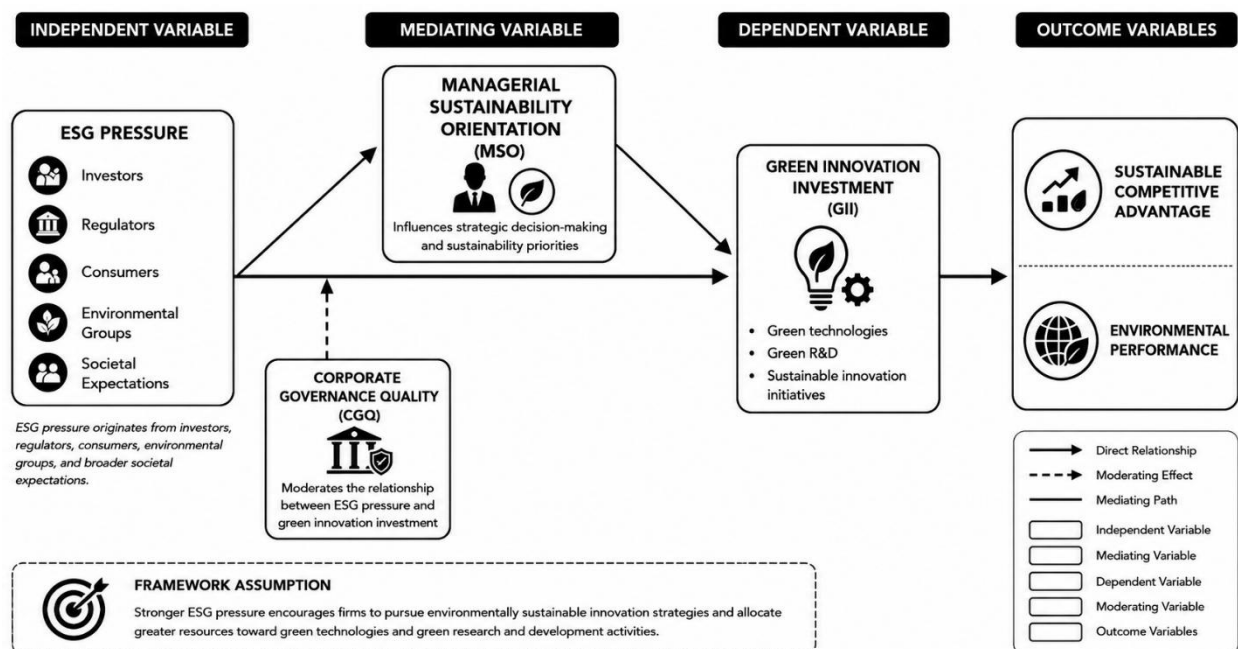


Figure 1: Conceptual framework of the incentive effects of ESG pressure on green innovation investment

Managerial sustainability orientation is incorporated as a mediating variable because managerial interpretation and commitment strongly influence how organizations respond to ESG-related pressures. Although external ESG expectations create institutional incentives for sustainability adoption, firms may not automatically engage in green innovation investment unless managers perceive sustainability as a strategic opportunity rather than merely a compliance requirement. Sustainability-oriented managers are more likely to integrate environmental priorities into strategic



planning, support long-term sustainable investments, and encourage environmentally responsible organizational behavior. This mediating relationship is theoretically supported by stakeholder and strategic management perspectives emphasizing the role of managerial cognition and strategic orientation in shaping organizational responses to external environmental pressures.

Corporate governance quality is proposed as a moderating variable influencing the strength of the relationship between ESG pressure and green innovation investment. Governance mechanisms such as board independence, sustainability oversight committees, accountability systems, and transparency structures improve organizational monitoring and strategic alignment regarding ESG objectives. From an institutional and governance perspective, firms with stronger governance structures are more capable of translating ESG-related pressures into effective sustainability-oriented investment decisions. Effective governance therefore strengthens the organization's ability to respond proactively to environmental expectations and long-term sustainability goals.

The framework further proposes that increased green innovation investment contributes to sustainable competitive advantage and improved environmental performance. This relationship is grounded in the resource-based view, which suggests that green innovation capability can function as a valuable, rare, and difficult-to-imitate strategic resource contributing to long-term competitiveness and organizational resilience (Barney, 1991). Investments in environmentally sustainable technologies and innovation systems may therefore enhance operational efficiency, corporate reputation, stakeholder trust, and long-term sustainability performance.

MATERIALS AND METHODS

Research Design

The study used a quantitative cross-sectional research design using a deductive research approach. The objective was to examine the relationship between ESG pressure and green innovation investment while evaluating the mediating role of managerial sustainability orientation and the moderating role of corporate governance quality.

Population and Sampling Procedure

The target population consisted of managerial professionals working in publicly listed firms operating in environmentally sensitive industries, including manufacturing, energy, automotive, pharmaceuticals, technology, and consumer goods sectors. Firms were identified through sustainability reporting databases, stock exchange sustainability indices, ESG disclosure reports, and publicly available corporate sustainability reports.

purposive sampling was first used to identify firms with established ESG disclosure practices and sustainability reporting systems. Subsequently, stratified sampling was used to ensure representation across managerial categories, including sustainability managers, finance managers, R&D managers, governance officers, and senior executives involved in strategic investment decisions.

A total of 520 questionnaires were distributed electronically through professional networks, corporate email communication, LinkedIn professional groups, and direct organizational contact.



Of these, 401 responses were received, representing a response rate of 77.1%. After excluding 29 incomplete or inconsistent responses, 372 usable questionnaires were retained for final analysis. To assess potential non-response bias, early and late respondents were compared using independent sample t-tests across key study variables. The results indicated no statistically significant differences, suggesting that non-response bias was unlikely to affect the findings significantly.

Questionnaire Development and Measurement Scales

The structured questionnaire was developed using previously validated measurement scales adapted from established ESG, sustainability, and innovation literature. Minor wording modifications were introduced to improve contextual relevance and clarity for managerial respondents.

ESG Pressure (ESGP)

Environmental, Social, and Governance (ESG) pressure was measured using five items adapted from prior institutional pressure and ESG disclosure literature. The construct assessed the extent to which firms experience external sustainability-related pressures from investors, regulators, stakeholders, and society regarding environmental responsibility and ESG compliance. Specifically, the measurement items captured investor ESG expectations, regulatory sustainability pressure, stakeholder environmental demands, ESG disclosure expectations, and public sustainability scrutiny. These dimensions collectively reflect the growing institutional and stakeholder pressures encouraging organizations to adopt environmentally responsible business practices and sustainability-oriented strategic behavior.

Green Innovation Investment (GII)

Green innovation investment was measured using five items adapted from prior studies on green innovation and sustainable investment behavior. The construct assessed the extent to which organizations allocate resources toward environmentally sustainable technologies, processes, and innovation initiatives. Specifically, the measurement items evaluated organizational investment in green research and development expenditure, renewable energy initiatives, clean technology adoption, sustainable product innovation, and environmental process improvement. These dimensions collectively reflect firms' strategic commitment toward environmentally responsible innovation practices and long-term sustainability-oriented operational development.

Managerial Sustainability Orientation (MSO)

Managerial sustainability orientation was measured using four items reflecting the extent to which organizational leaders prioritize environmental sustainability within strategic planning and decision-making processes. The construct assessed managerial commitment toward sustainability, long-term environmental vision, integration of sustainability into corporate strategy, and managerial support for green initiatives and environmentally responsible investment decisions. Representative measurement items included statements such as "Top management actively promotes sustainability-oriented innovation," "Environmental sustainability is integrated into



strategic investment decisions,” and “Managers prioritize long-term environmental objectives over short-term gains.” These dimensions collectively capture the strategic and behavioral orientation of managers toward sustainability-driven organizational development and green innovation practices.

Corporate Governance Quality (CGQ)

Corporate governance quality was measured using four items related to the effectiveness of governance structures and sustainability oversight mechanisms within organizations. The construct assessed board independence, ESG oversight mechanisms, sustainability committees, and transparency and accountability systems supporting sustainability-oriented strategic control and organizational monitoring. These dimensions reflect the extent to which firms possess effective governance frameworks capable of enhancing managerial accountability, sustainability oversight, and responsiveness to ESG-related stakeholder expectations. All measurement items were assessed using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Common Method Bias Assessment

Because the study relied on self-reported cross-sectional survey data, several procedural and statistical remedies were employed to minimize common method bias (CMB). Procedurally, respondents were assured anonymity and confidentiality to reduce social desirability bias.

Statistically, Harman’s single-factor test was conducted. The first unrotated factor explained 34.7% of the total variance, which is below the recommended threshold of 50%, indicating that common method bias was not a serious concern.

Additionally, full collinearity variance inflation factor (VIF) values were assessed following Kock’s recommendation. All VIF values were below the threshold of 3.3, further confirming the absence of significant common method bias.

Data Analysis Techniques

Data analysis was conducted using SPSS 29 and SmartPLS 4 to examine the relationships among ESG pressure, managerial sustainability orientation, corporate governance quality, and green innovation investment. The study employed multiple statistical techniques, including descriptive statistics, correlation analysis, multiple regression analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM), mediation analysis, moderation analysis, effect size analysis (f^2), predictive relevance analysis (Q^2), and robustness analysis. PLS-SEM was selected due to its suitability for predictive and exploratory causal modelling involving complex mediation and moderation relationships within the proposed conceptual framework.

The reliability and validity of the measurement model were also rigorously evaluated. Reliability was assessed using Cronbach’s Alpha and Composite Reliability (CR), while convergent validity was examined through Average Variance Extracted (AVE). Discriminant validity was assessed using the Heterotrait–Monotrait ratio (HTMT) and cross-loading analysis to ensure adequate construct distinctiveness and measurement accuracy.



Reliability and Validity Analysis

The reliability and validity of the measurement model were evaluated using Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), factor loadings, and discriminant validity analysis. All constructs exceeded the recommended reliability thresholds. Cronbach's Alpha values ranged from 0.864 to 0.903, while Composite Reliability values ranged from 0.887 to 0.921, confirming strong internal consistency reliability.

Convergent validity was assessed through factor loadings and AVE values. All indicator loadings exceeded the recommended threshold of 0.70, and AVE values were greater than 0.50, indicating satisfactory convergent validity.

Discriminant validity was further examined using the Heterotrait-Monotrait ratio (HTMT). All HTMT values were below the recommended threshold of 0.85, confirming construct distinctiveness and reducing concerns regarding conceptual overlap among variables.

Additionally, cross-loading analysis demonstrated that all indicators loaded more strongly on their respective constructs than on other constructs, confirming measurement adequacy.

RESULTS AND DISCUSSION

Respondent Profile

The study analyzed responses from 372 managerial professionals working in environmentally sensitive and innovation-intensive industries, including manufacturing, energy, automotive, pharmaceuticals, technology, and consumer goods sectors. The respondents consisted of senior executives and professionals directly involved in sustainability management, financial decision-making, research and development, and corporate governance activities. The inclusion of experienced managerial personnel enhanced the reliability and credibility of the empirical findings because these respondents possessed substantial knowledge regarding ESG practices, sustainability strategies, governance systems, and organizational investment decisions. The diverse representation across managerial positions and industries also improved the robustness of the study by capturing multiple perspectives related to sustainability-oriented strategic decision-making.

Table 1 presents the demographic characteristics of the respondents included in the study. Male respondents accounted for 61.3% of the sample, while female respondents represented 38.7%. Regarding age distribution, the majority of respondents belonged to the 36–45 years category (46.0%), followed by respondents above 45 years (28.2%) and those between 25–35 years (25.8%). In terms of organizational position, senior management professionals constituted the largest group (31.7%), followed by sustainability managers (22.6%), finance managers (19.6%), R&D managers (16.4%), and governance officers (9.7%). The professional experience profile further indicates that the respondents possessed substantial managerial expertise, with 42.2% having more than 10 years of experience and 39.8% having between 5–10 years of experience.

Table 1: Demographic profile of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	228	61.3
	Female	144	38.7
Age	25–35 Years	96	25.8
	36–45 Years	171	46.0
	Above 45 Years	105	28.2
Position	Senior Management	118	31.7
	Sustainability Managers	84	22.6
	Finance Managers	73	19.6
	R&D Managers	61	16.4
	Governance Officers	36	9.7
Experience	Less than 5 Years	67	18.0
	5–10 Years	148	39.8
	More than 10 Years	157	42.2

The demographic composition demonstrates that the study captured informed perspectives from experienced professionals directly involved in ESG implementation, sustainability governance, strategic planning, innovation management, and investment decision-making processes. The high proportion of senior managerial and sustainability-related positions strengthens the credibility of the responses because these individuals are actively engaged in organizational sustainability initiatives and green investment activities.

Descriptive Statistics

Descriptive statistics were employed to examine the central tendency, variability, and distribution of the study variables, including ESG pressure (ESGP), green innovation investment (GII), managerial sustainability orientation (MSO), and corporate governance quality (CGQ). The results indicated in Table 2 relatively high mean values across all constructs, suggesting that the sampled firms demonstrated substantial commitment toward sustainability-oriented practices, ESG responsiveness, and environmentally responsible innovation strategies.

ESG pressure recorded the highest mean value ($M = 4.11$, $SD = 0.68$), indicating that firms experienced considerable pressure from investors, regulators, consumers, environmental groups, and broader societal stakeholders regarding ESG compliance, sustainability reporting, and environmental accountability. This finding supports the institutional and stakeholder perspectives underlying the conceptual framework, suggesting that organizations increasingly operate under strong ESG-related expectations.

Managerial sustainability orientation also demonstrated a high mean score ($M = 4.05$, $SD = 0.66$), reflecting strong managerial commitment toward environmental sustainability, long-term sustainability vision, and integration of sustainability objectives into strategic decision-making processes. The result suggests that managerial respondents generally perceived sustainability as an important organizational priority rather than merely a compliance requirement.

Green innovation investment reported a relatively high mean value ($M = 3.96$, $SD = 0.71$), indicating increasing organizational emphasis on green technologies, environmentally sustainable R&D, renewable energy initiatives, and sustainable operational systems. This finding implies that firms are progressively allocating resources toward environmentally responsible innovation activities in response to evolving ESG expectations and competitive sustainability pressures.

Corporate governance quality recorded a mean value of 3.88 ($SD = 0.74$), suggesting that the sampled organizations possessed relatively strong governance structures supporting sustainability oversight, transparency, accountability, and ESG-related strategic monitoring. The slightly higher standard deviation for governance quality indicates moderate variability among firms regarding governance effectiveness and sustainability governance mechanisms.

Table 2: Descriptive statistics of study variables

Variable	Mean	Standard Deviation	Minimum	Maximum
ESG Pressure (ESGP)	4.11	0.68	2.10	5.00
Green Innovation Investment (GII)	3.96	0.71	1.95	5.00
Managerial Sustainability Orientation (MSO)	4.05	0.66	2.25	5.00
Corporate Governance Quality (CGQ)	3.88	0.74	2.00	5.00

Reliability and Validity Analysis

Reliability and validity analyses were conducted to evaluate the consistency, convergent validity, and discriminant validity of the measurement constructs used in the study. All constructs demonstrated strong internal consistency reliability and satisfactory measurement validity. Cronbach's Alpha values ranged from 0.864 to 0.903, exceeding the recommended threshold of 0.70 and confirming acceptable reliability of the measurement scales. Similarly, Composite Reliability (CR) values ranged from 0.887 to 0.921, indicating strong construct reliability and internal consistency among the measurement items.

Convergent validity was assessed using factor loadings and Average Variance Extracted (AVE). All factor loadings exceeded the recommended threshold of 0.70, demonstrating that the indicators adequately represented their respective latent constructs. In addition, all AVE values were above the acceptable benchmark of 0.50, confirming that the constructs explained a substantial proportion of variance in their indicators.

Discriminant validity was further examined using the Heterotrait–Monotrait Ratio (HTMT) criterion and cross-loading analysis. All HTMT values were below the recommended threshold of 0.85, indicating satisfactory construct distinctiveness and confirming that the constructs were empirically different from one another. Cross-loading analysis additionally revealed that each measurement item loaded more strongly on its respective construct than on other constructs, further supporting discriminant validity. The findings confirmed acceptable reliability and validity for the structural analysis.

Table 3: Reliability, convergent validity, and discriminant validity results

Construct	Cronbach's Alpha	Composite Reliability	AVE	Factor Loading Range	HTMT Values
ESG Pressure (ESGP)	0.891	0.912	0.675	0.742 – 0.861	< 0.85
Green Innovation Investment (GII)	0.903	0.921	0.702	0.756 – 0.884	< 0.85
Managerial Sustainability Orientation (MSO)	0.876	0.899	0.648	0.731 – 0.852	< 0.85
Corporate Governance Quality (CGQ)	0.864	0.887	0.621	0.718 – 0.841	< 0.85

Note: All factor loadings exceeded 0.70. All HTMT ratios were below the recommended threshold of 0.85, confirming discriminant validity. Cross-loading results indicated that all indicators loaded highest on their respective constructs.

Correlation Analysis

Correlation analysis was conducted to examine the strength, direction, and interrelationships among ESG pressure (ESGP), green innovation investment (GII), managerial sustainability orientation (MSO), and corporate governance quality (CGQ). The results presented in Table 4 revealed significant positive relationships among all study variables at the 1% significance level, indicating that stronger ESG-related pressures are associated with higher levels of managerial sustainability orientation, improved governance quality, and greater investment in environmentally sustainable innovation activities.

Specifically, ESG pressure demonstrated a strong positive correlation with green innovation investment ($r = 0.672$, $p < 0.01$), suggesting that firms experiencing greater pressure from investors, regulators, consumers, and societal stakeholders tend to allocate more resources toward green technologies, sustainable R&D, and environmentally responsible operational systems. ESG pressure also exhibited a significant positive relationship with managerial sustainability orientation ($r = 0.614$, $p < 0.01$), indicating that increased ESG scrutiny encourages managers to integrate sustainability priorities into strategic decision-making processes.

Managerial sustainability orientation showed the strongest correlation with green innovation investment ($r = 0.689$, $p < 0.01$), emphasizing the critical role of managerial commitment and sustainability-focused leadership in promoting environmentally sustainable investment behavior. Corporate governance quality also demonstrated significant positive correlations with ESG pressure ($r = 0.531$, $p < 0.01$), green innovation investment ($r = 0.587$, $p < 0.01$), and managerial sustainability orientation ($r = 0.492$, $p < 0.01$), highlighting the importance of governance effectiveness, transparency, and accountability in strengthening organizational sustainability practices.

Although the correlations among the constructs were moderately strong, none exceeded the commonly accepted threshold of 0.80, indicating the absence of severe multicollinearity concerns.

and supporting construct distinctiveness. These findings are further consistent with the discriminant validity results obtained through the HTMT analysis and cross-loading assessment reported in the measurement model evaluation. The correlation results collectively provide preliminary empirical support for the proposed hypotheses and confirm the suitability of the variables for subsequent regression and structural equation modeling analyses.

Table 4: Correlation matrix

Variables	ESGP	GII	MSO	CGQ
ESG Pressure (ESGP)	1.000			
Green Innovation Investment (GII)	0.672**	1.000		
Managerial Sustainability Orientation (MSO)	0.614**	0.689**	1.000	
Corporate Governance Quality (CGQ)	0.531**	0.587**	0.492**	1.000

Note: $p < 0.01$ indicates statistical significance at the 1% level.

Regression Analysis

Multiple regression analysis was conducted to examine the influence of ESG pressure, managerial sustainability orientation, and corporate governance quality on green innovation investment while controlling firm size and financial performance. Prior to regression estimation, multicollinearity diagnostics were assessed using Variance Inflation Factor (VIF) values. All VIF values were below the recommended threshold of 3.3, indicating the absence of serious multicollinearity concerns and further reducing potential common method bias issues.

The regression results presented in Table 5 indicate that ESG pressure exerts a significant and positive influence on green innovation investment ($\beta = 0.438$, $p < 0.001$), thereby providing strong support for Hypothesis 1. This finding suggests that firms experiencing stronger ESG-related pressures from investors, regulators, environmental groups, and societal stakeholders are more likely to allocate resources toward environmentally sustainable innovation initiatives. The result supports stakeholder theory and institutional theory by demonstrating that external ESG expectations encourage firms to adopt proactive sustainability-oriented investment strategies rather than merely engaging in symbolic compliance behavior.

Managerial sustainability orientation also demonstrated a significant positive effect on green innovation investment ($\beta = 0.316$, $p < 0.001$), indicating that managers with stronger sustainability commitment and long-term environmental orientation are more likely to support green investment decisions and environmentally responsible innovation initiatives. This finding reinforces the argument that managerial cognition and strategic orientation play an important role in translating external ESG pressures into actual organizational sustainability investments.

Similarly, corporate governance quality exerted a significant positive influence on green innovation investment ($\beta = 0.221$, $p < 0.001$), highlighting the importance of governance effectiveness, board oversight, transparency, and accountability mechanisms in supporting sustainability-oriented strategic investment decisions. Firms with stronger governance systems appear more capable of integrating ESG considerations into long-term innovation planning and resource allocation processes.

Table 5: Multiple regression results

Variables	Beta Coefficient	Standard Error	t-value	p-value	VIF
Constant	0.924	0.218	4.238	0.000	—
ESG Pressure (ESGP)	0.438	0.051	8.588	0.000	2.114
Managerial Sustainability Orientation (MSO)	0.316	0.048	6.583	0.000	2.008
Corporate Governance Quality (CGQ)	0.221	0.044	5.023	0.000	1.842
Firm Size	0.117	0.036	3.250	0.001	1.437
Financial Performance	0.084	0.031	2.709	0.007	1.326

Among the control variables, firm size ($\beta = 0.117$, $p < 0.01$) and financial performance ($\beta = 0.084$, $p < 0.01$) also showed significant positive effects on green innovation investment, suggesting that larger and financially stronger firms possess greater organizational capacity and financial flexibility to undertake environmentally sustainable innovation initiatives.

The overall regression model demonstrated substantial explanatory power, with an R^2 value of 0.642 and an adjusted R^2 value of 0.633, indicating that approximately 64.2% of the variation in green innovation investment was explained by the independent and control variables included in the model. Furthermore, the significant F-statistic ($F = 72.418$, $p < 0.001$) confirms the overall fitness and statistical significance of the regression model.

Model statistics

Statistics	Value
R^2	0.642
Adjusted R^2	0.633
F-statistic	72.418
Significance	0.000

Structural Equation Modeling (SEM)

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to examine the direct, mediating, and moderating relationships among ESG pressure, managerial sustainability orientation, corporate governance quality, and green innovation investment. The structural model was additionally assessed using model fit indices, predictive relevance measures, and effect size statistics to enhance methodological rigor and robustness.

The SEM results presented in Table 6 indicate that ESG pressure exerts a significant positive direct effect on green innovation investment ($\beta = 0.421$, $t = 8.102$, $p < 0.001$), supporting Hypothesis 1. This finding suggests that stronger ESG-related institutional and stakeholder pressures encourage firms to allocate greater resources toward environmentally sustainable technologies, green R&D, and sustainable innovation initiatives.

The analysis further revealed that ESG pressure significantly influences managerial sustainability orientation ($\beta = 0.596$, $t = 10.875$, $p < 0.001$), while managerial sustainability orientation positively affects green innovation investment ($\beta = 0.337$, $t = 6.749$, $p < 0.001$). The indirect effect confirms the mediating role of managerial sustainability orientation, indicating that sustainability-oriented managerial commitment partially explains how ESG pressure translates into green innovation investment behavior.

The moderation analysis demonstrated that corporate governance quality significantly strengthens the relationship between ESG pressure and green innovation investment ($\beta = 0.184$, $t = 3.992$, $p < 0.001$). Firms with stronger governance structures, sustainability oversight mechanisms, and accountability systems appear more capable of converting ESG-related pressures into proactive sustainability-oriented investment decisions. The interaction plot further showed that firms with higher governance quality exhibited a stronger positive relationship between ESG pressure and green innovation investment compared to firms with weaker governance systems.

Table 6: SEM path analysis

Path Relationship	Path Coefficient	t-value	p-value	Effect Size (f^2)
ESGP $\rightarrow$ GII	0.421	8.102	0.000	0.312
ESGP $\rightarrow$ MSO	0.596	10.875	0.000	0.428
MSO $\rightarrow$ GII	0.337	6.749	0.000	0.214
CGQ $\times$ ESGP $\rightarrow$ GII	0.184	3.992	0.000	0.126

The structural model presented in Table 7 also demonstrated satisfactory explanatory and predictive capability. The standardized root mean square residual (SRMR) value of 0.061 remained below the recommended threshold of 0.08, indicating acceptable model fit. The predictive relevance statistic Q^2 for green innovation investment was 0.417, confirming strong predictive relevance of the model. Furthermore, the effect size (f^2) results indicate that ESG pressure exerted a substantial effect on green innovation investment, while managerial sustainability orientation and corporate governance quality demonstrated moderate effects.

Table 7: Structural model fit and predictive relevance

Indicator	Value	Recommended Threshold
SRMR	0.061	< 0.08
Q^2 (GII)	0.417	> 0
R^2 (GII)	0.642	Moderate to Substantial
Adjusted R^2	0.633	Moderate to Substantial

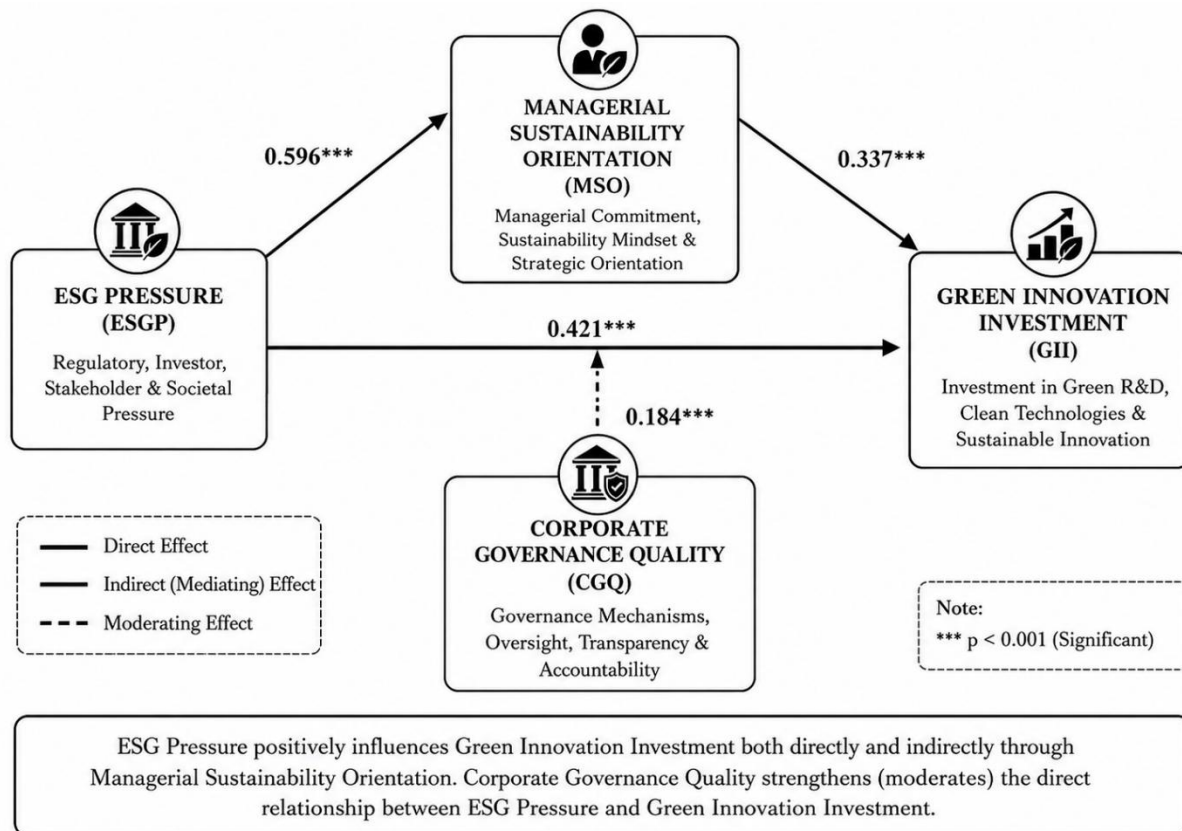


Figure 2: Structural equation model of ESG impact

Figure 2 presents the structural relationships among ESG pressure, managerial sustainability orientation, corporate governance quality, and green innovation investment. The model shows that ESG pressure positively influences green innovation investment both directly and indirectly through managerial sustainability orientation. The mediation effect indicates that managers with stronger sustainability commitment and strategic environmental orientation are more likely to translate ESG-related pressures into proactive green investment decisions.

The figure further demonstrates the moderating role of corporate governance quality in strengthening the relationship between ESG pressure and green innovation investment. Firms with effective governance mechanisms, stronger oversight systems, and greater transparency exhibit a higher capacity to respond strategically to ESG expectations through environmentally sustainable innovation initiatives.

Mediation and Moderation Analysis

Mediation and moderation analyses were conducted using PLS-SEM to examine the indirect and conditional relationships within the proposed conceptual framework. The results indicate that managerial sustainability orientation significantly mediates the relationship between ESG pressure and green innovation investment. Specifically, ESG pressure positively influences managerial

sustainability orientation, which subsequently enhances firms' investment in environmentally sustainable technologies, green R&D, and sustainability-oriented innovation initiatives. The significant indirect effect confirms that sustainability-oriented managerial commitment plays an important role in translating external ESG-related pressures into proactive organizational investment behavior.

The mediation findings suggest that ESG pressure alone may not automatically result in green innovation investment unless managers internalize sustainability objectives within strategic planning and organizational decision-making processes. Managers with stronger sustainability orientation are more likely to perceive ESG-related expectations as strategic opportunities for long-term competitiveness, innovation capability development, and corporate legitimacy enhancement rather than merely compliance obligations. The partial mediation effect further indicates that ESG pressure influences green innovation investment both directly and indirectly through managerial sustainability orientation.

The moderation analysis additionally revealed that corporate governance quality significantly strengthens the relationship between ESG pressure and green innovation investment. Firms with stronger governance structures, effective board oversight, transparency systems, sustainability monitoring mechanisms, and accountability practices demonstrated greater responsiveness to ESG-related stakeholder expectations. The interaction effect suggests that governance quality enhances the organization's ability to convert ESG-related institutional pressures into effective sustainability-oriented strategic investment decisions.

These findings collectively support stakeholder theory, legitimacy theory, institutional theory, and the resource-based view by demonstrating that managerial sustainability orientation and governance quality function as critical organizational mechanisms linking ESG pressure to green innovation investment behavior.

Table 8 presents the mediation analysis results examining the indirect effect of ESG pressure on green innovation investment through managerial sustainability orientation. The significant indirect effect value (0.201) confirms that managerial sustainability orientation partially mediates the relationship between ESG pressure and green innovation investment. The total effect value (0.622) further demonstrates the combined direct and indirect influence of ESG pressure on organizational green innovation activities. These findings indicate that ESG-related stakeholder and institutional pressures not only directly encourage firms to invest in green innovation but also indirectly shape managerial sustainability commitment and strategic decision-making processes that promote environmentally responsible investment behavior.

Table 8: Mediation analysis results

Relationship	Direct Effect	Indirect Effect	Total Effect	Mediation Type
ESGP → MSO → GII	0.421	0.201	0.622	Partial Mediation

Hypotheses Testing Summary

The hypotheses testing results presented in Table 9 indicate substantial empirical support for the proposed conceptual framework. The findings confirm that ESG pressure significantly and

positively influences green innovation investment, suggesting that firms experiencing stronger ESG-related scrutiny are more likely to allocate resources toward environmentally sustainable innovation activities.

The results further demonstrate that ESG pressure positively influences managerial sustainability orientation, supporting the argument that external stakeholder and institutional pressures shape managerial sustainability commitment and strategic environmental priorities. Managerial sustainability orientation was also found to significantly mediate the relationship between ESG pressure and green innovation investment, confirming the importance of managerial commitment in translating ESG expectations into practical sustainability-oriented investment decisions.

In addition, corporate governance quality significantly moderates the relationship between ESG pressure and green innovation investment, indicating that firms with stronger governance structures, sustainability oversight mechanisms, and accountability systems exhibit greater responsiveness to ESG-related pressures.

Table 9: Hypotheses testing summary

Hypothesis	Result
H1: ESG pressure positively affects green innovation investment	Supported
H2: ESG pressure positively influences managerial sustainability orientation	Supported
H3: Managerial sustainability orientation mediates the ESG–green innovation investment relationship	Supported
H4: Corporate governance quality moderates the ESG–green innovation investment relationship	Supported

DISCUSSION

The findings demonstrate that ESG pressure functions not merely as a compliance mechanism but as a strategic driver of environmentally sustainable innovation investment. Firms experiencing stronger ESG-related scrutiny from regulators, investors, consumers, and society were more likely to allocate resources toward green R&D, clean technologies, renewable energy initiatives, and environmentally sustainable operational systems.

The positive relationship between ESG pressure and green innovation investment supports stakeholder theory, legitimacy theory, and institutional theory. Stakeholder expectations appear to encourage firms to pursue sustainability-oriented innovation strategies in order to maintain legitimacy, strengthen reputation, and improve long-term stakeholder relationships. Institutional pressures, including regulatory requirements and competitive sustainability standards, further motivate firms to integrate ESG considerations into strategic investment behavior.

Importantly, the findings suggest that ESG pressure stimulates proactive strategic adaptation rather than merely passive compliance behavior. This finding contrasts with prior studies arguing that ESG-related requirements may constrain innovation due to increased compliance costs and managerial burdens. One possible explanation for the present findings is that firms increasingly



perceive sustainability investment as a long-term strategic capability capable of generating reputational benefits, operational efficiencies, and competitive differentiation.

The mediating role of managerial sustainability orientation further indicates that managerial interpretation of ESG expectations significantly influences organizational sustainability behavior. External ESG pressure alone may not automatically produce green innovation investment unless managers internalize sustainability objectives and integrate them into strategic planning processes. Sustainability-oriented leadership therefore plays a crucial role in transforming external institutional pressure into proactive innovation initiatives.

The moderating effect of corporate governance quality also highlights the strategic importance of governance structures in ESG implementation. Firms with stronger governance systems, sustainability committees, independent boards, and accountability mechanisms demonstrated greater responsiveness to ESG-related expectations. Effective governance appears to strengthen organizational capability to align sustainability objectives with long-term innovation strategies.

The findings additionally provide important contextual insights for environmentally sensitive industries in emerging economies. In such contexts, increasing ESG scrutiny, evolving regulatory systems, and growing investor expectations may accelerate organizational sustainability transformation and encourage firms to adopt environmentally responsible innovation strategies more proactively.

At the same time, the study recognizes that ESG-driven innovation investment may involve implementation challenges, including high initial costs, technological uncertainty, resource constraints, and long payback periods. Smaller firms and resource-constrained organizations may experience greater difficulty responding effectively to ESG-related pressures. Therefore, the positive effects of ESG pressure should not be interpreted as universally automatic across all organizational contexts.

Practical Implications

Corporate Managers

Managers should interpret ESG pressure as a strategic opportunity for long-term capability development rather than solely as a regulatory obligation. Organizations should integrate sustainability objectives into strategic planning, innovation management, and capital allocation processes.

Managers should also establish measurable sustainability targets, allocate dedicated green R&D budgets, and implement sustainability-oriented performance evaluation systems. Industry-specific implementation strategies are necessary because sustainability priorities differ across manufacturing, energy, technology, and consumer sectors.

Investors

Investors should evaluate firms not only based on ESG disclosure quality but also on their actual green innovation capability and long-term sustainability investment behavior. Green innovation indicators may provide stronger signals regarding long-term resilience and strategic sustainability capability.



Policymakers

Policymakers should strengthen ESG disclosure standards, provide green financing incentives, and support sustainable innovation ecosystems through tax incentives, green subsidies, and sustainability-oriented industrial policies.

Corporate Governance Bodies

Boards of directors should establish ESG oversight committees, integrate sustainability objectives into governance frameworks, and link executive compensation with long-term sustainability performance indicators.

CONCLUSION

ESG pressure serves as a significant strategic driver of green innovation investment among firms operating in environmentally sensitive industries. The findings demonstrate that increasing pressure from investors, regulators, consumers, and broader societal stakeholders encourages firms to allocate greater resources toward environmentally sustainable technologies, green research and development, renewable energy initiatives, and sustainable operational systems.

The study further reveals that managerial sustainability orientation partially mediates the relationship between ESG pressure and green innovation investment, indicating that managerial commitment and sustainability-focused strategic thinking play a critical role in translating external ESG expectations into organizational innovation behavior. Corporate governance quality additionally strengthens this relationship through effective oversight, accountability mechanisms, and sustainability governance structures.

By integrating stakeholder theory, legitimacy theory, institutional theory, and the resource-based view into a unified framework, the study provides a more comprehensive explanation of ESG-driven green innovation behavior. The findings suggest that ESG pressure increasingly functions as a strategic incentive promoting long-term organizational resilience, sustainability capability, and competitive advantage rather than merely imposing compliance obligations.

Nevertheless, ESG-driven innovation investment may also involve implementation challenges related to compliance costs, technological uncertainty, and resource constraints. Firms therefore require strong governance systems, managerial commitment, and long-term strategic orientation to effectively convert ESG-related pressures into sustainable innovation outcomes.

The study contributes important theoretical and managerial insights regarding how organizations can strategically respond to growing ESG expectations while simultaneously enhancing sustainability performance and long-term competitiveness.

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