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Strategic Sustainability through the RBV Lens: ESG as a Moderator in the Link Between Environmental Innovation, Sustainable Supply Chains and Financial Performance

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ABSTRACT

In response to increasing global concern over climate change and stricter environmental regulations, companies are adopting green strategies to mitigate environmental impacts and sustain their competitiveness. This study aims to bridge the internally driven Resource-Based View (RBV) and the externally oriented Stakeholder Theory by examining the moderating role of Environmental, Social, and Governance (ESG) practices in the relationship between environmental innovation, sustainable supply chain management (SSCM), and financial performance. The research theoretically contributes by integrating these two major frameworks and empirically providing insights into how sustainability initiatives influence corporate outcomes. A quantitative research design targets medium and large enterprises that disclose ESG performance or engage in certified environmental programs. Purposive sampling is used to identify respondents in managerial roles relevant to sustainability and operations. The data is collected via structured questionnaires, measured using a five-point Likert scale, and analyzed through Structural Equation Modeling (SEM) using SmartPLS. The analysis includes measurement and structural model assessments to evaluate construct validity, reliability, and the hypothesized moderation effects. The findings are expected to offer practical implications for firms in designing integrated sustainability strategies and to support stakeholders in evaluating ESG governance as a catalyst for financial performance.

Keywords: Environmental Innovation, Sustainable Supply Chains, Strategic Sustainability, ESG, Financial Performance

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INTRODUCTION

In recent years, companies across various sectors have been increasingly compelled to respond to dual imperatives: environmental sustainability and stakeholder accountability (Khan & Iqbal, 2024; Sahelices-Pinto et al., 2020; Sulemana et al., 2025). As global concerns over climate change intensify and environmental regulations become more stringent, firms adopt green strategies to reduce environmental impacts and sustain their competitive edge in the marketplace (Lin et al., 2020; Su et al., 2020). Simultaneously, diverse stakeholders—including investors, customers, regulators, and the broader

public—are demanding greater transparency and responsibility, particularly through compliance with Environmental, Social, and Governance (ESG) standards (Agbakwuru et al., 2024; Zhang & Huang, 2024).

In this evolving landscape, environmental innovation and sustainable supply chain management (SSCM) have emerged as two critical strategic orientations for firms seeking to align their operations with sustainability objectives. Environmental innovation refers to developing or adopting environmentally friendly technologies and practices, while SSCM involves the integration of environmental and social dimensions into supply chain operations. From the perspective of the Resource-Based View (RBV), both are considered strategic capabilities—valuable, rare, inimitable, and non-substitutable—thus offering potential sources of competitive advantage (Mugoni et al., 2024; Stroumpoulis et al., 2024; Truant et al., 2024).

However, the financial outcomes of such sustainability strategies may be contingent upon the degree to which companies engage with their stakeholders (Aladaileh et al., 2024; Mugoni et al., 2024). Stakeholder Theory posits that aligning organizational strategies with stakeholder expectations is essential for maintaining legitimacy and ensuring long-term performance (Hamed et al., 2023; Velte, 2023). ESG practices—conceptualized as mechanisms for such alignment—may thus act as moderators that enhance the effect of sustainability strategies on financial performance (De Souza Barbosa et al., 2023; Demiraj et al., 2025). Within the RBV framework, environmental innovation and SSCM represent internally driven resources, while ESG embodies external governance mechanisms that could condition their effectiveness (Abbasi Kamardi et al., 2022; Arda et al., 2023).

This study aims to bridge internal resource-based perspectives with stakeholder-oriented governance mechanisms by examining the moderating role of ESG in the relationship between environmental innovation, SSCM, and financial performance. By integrating RBV and Stakeholder Theory, this research contributes to the literature theoretically and empirically by offering a unified model of strategic sustainability.

Despite a growing body of research on sustainability practices and firm performance, several critical gaps remain. First, there is limited integration between RBV and Stakeholder Theory in explaining how internal capabilities and external pressures jointly shape organizational outcomes. Second, there is a lack of empirical studies specifically addressing ESG as a moderating variable in the relationship between sustainability-oriented practices—such as environmental innovation and SSCM—and financial performance. Third, few studies have examined the interactive effects of multiple sustainability constructs within a single empirical model.

This study seeks to address these gaps by developing and testing an integrated conceptual framework that combines internal and external sustainability drivers, assessing their collective impact on firm performance. The findings are expected to offer theoretical insights and practical guidance for companies aiming to enhance financial outcomes through strategic sustainability efforts.

LITERATURE REVIEW

Environmental Innovation and Financial Performance

Innovation has long been recognized as a driving force of industrial transformation. In the Fourth Industrial Revolution context, environmental innovation has expanded beyond the technological advancements of Industry 3.0 to emphasize intergenerational resource sustainability (Johl & Toha, 2021). Environmental innovation encompasses the development or adoption of new products, processes, services, or managerial methods that aim to reduce environmental risks and the impact of resource usage, with a particular focus on product, process, and technology pillars (Tang et al., 2023).

From the Resource-Based View (RBV), firms gain competitive advantage by developing strategic capabilities that are valuable, rare, inimitable, and non-substitutable. Environmental innovation aligns with this view as it enables organizations to lower operating costs, meet environmental regulations, and enhance brand reputation, thereby positively influencing financial performance (Chen et al., 2006;

Bitencourt et al., 2020; García-Granero et al., 2020; Porter & van der Linde, 1995). Recent studies have further suggested that ESG disclosures significantly promote green innovation, which, in turn, contributes to improved financial outcomes (Freeman et al., 2021; Lian et al., 2023; Zhou et al., 2023).

Environmental innovation—often framed as green or eco-innovation—is regarded as a component of overall innovation strategy and is considered an essential path toward sustainable environmental growth (Barbieri & Santos, 2020; Ilyas & Osiyevskyy, 2022; Li et al., 2023). Based on this synthesis, the following hypothesis is proposed:

H_1: *Environmental innovation has a positive effect on financial performance.*

Sustainable Supply Chain Management and Financial Performance

Sustainable Supply Chain Management (SSCM) integrates environmental and social considerations into supply chain operations. Within the RBV framework, SSCM is a complex and strategic organizational capability that enhances operational efficiency, mitigates risk, and supports long-term sustainability (Gold et al., 2010; Kamble et al., 2018; Özbay, 2021). Firms implementing SSCM practices are more likely to operate resilient and transparent supply chains, contributing positively to financial performance.

Furthermore, SSCM provides firms with a mechanism to align sustainability with supply chain financing, improving efficiency, stakeholder reputation, and long-term financial growth (Jones, 2025; Rahi et al., 2022). According to natural resource-based theory, sustainable supply chain strategies are vital for pollution prevention, product stewardship, and sustainable development (Yunus & Michalisin, 2016; Majumdar et al., 2021). SSCM implementation—such as sustainable sourcing and reverse logistics—has been empirically shown to drive financial metrics, including Return on Assets (ROA) and Return on Equity (ROE) (Özbay, 2021; Novitasari et al., 2023). Based on this synthesis, the following hypothesis is proposed:

H_2: *Sustainable supply chain management has a positive effect on financial performance.*

ESG as a Moderating Factor

Stakeholder Theory posits that firms must align strategic actions with stakeholder expectations to achieve legitimacy and sustainable performance (Freeman et al., 2021). ESG practices offer formalized mechanisms through which companies demonstrate environmental and social accountability. When embedded into organizational governance, ESG can attract responsible investors, enhance firm reputation, and reduce risk factors that may amplify the effectiveness of sustainability strategies on firm outcomes (Eccles et al., 2014; Nirino et al., 2021; Ferdous et al., 2025; Huang et al., 2024; Wu et al., 2022).

High-quality ESG implementation has been associated with stronger stakeholder relationships, improved corporate reputation, and sustainable long-term value creation (Murè et al., 2024). Firms that proactively engage in ESG-driven stakeholder initiatives tend to exhibit superior financial performance (Duan et al., 2023; García-Amate et al., 2023; Shang, 2024; Siwei & Chalermkiat, 2023; Tang et al., 2023). Moreover, comprehensive ESG frameworks have shown particular effectiveness in industries with high environmental exposure (Azimli & Cek, 2024; Li et al., 2023; Liu et al., 2024; Wu et al., 2024).

However, inconsistencies in prior findings reveal the importance of contextual variables such as financial constraints, regulatory frameworks, and geographic settings (Maaloul et al., 2023; Duan et al., 2023; Vargas-Santander et al., 2025). Some studies report positive ESG performance links (Aydoğmuş et al., 2022; Bissoondoyal-Bheenick et al., 2023), while others yield ambiguous or adverse outcomes. These variations underscore the need to evaluate ESG as a direct contributor to performance and as a moderating factor that conditions the effectiveness of environmental innovation and SSCM strategies. Based on this synthesis, the following hypothesis is proposed:

H_{3a}: *ESG positively moderates the relationship between environmental innovation and financial performance.*

***H_{3b}**: ESG positively moderates the relationship between sustainable supply chain management and financial performance.*

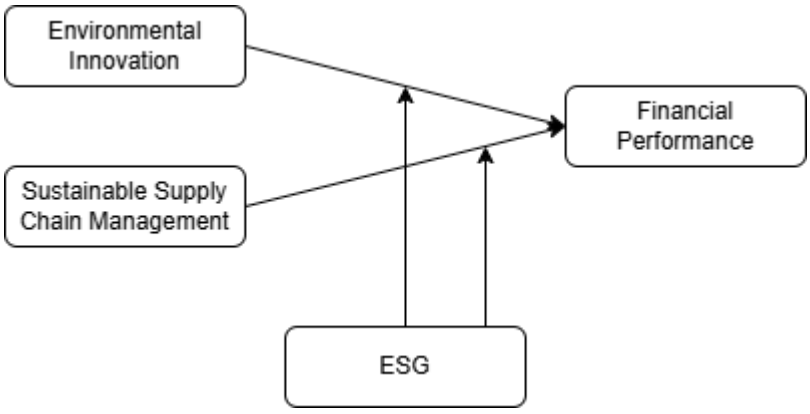

Figure 1. Research Framework

METHOD

This study employs a quantitative research design to investigate the relationship between environmental innovation, sustainable supply chain management (SSCM), ESG practices, and financial performance. The target population comprises medium and large enterprises actively engaged in sustainability initiatives, particularly those disclosing ESG performance or participating in environmental certification programs (e.g., ISO 14001). These companies were selected as they are more likely to implement structured environmental strategies and ESG practices.

Data Collection

A purposive sampling technique was applied to identify respondents in managerial positions directly involved in sustainability, operations, or supply chain decision-making. This non-probability method was chosen to ensure that data would be gathered from individuals with sufficient domain knowledge relevant to the study's constructs. Primary data were collected using a structured questionnaire administered both in person and online via email.

The questionnaire included 20 items adapted from validated instruments in previous studies. Each item was measured using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The sample size was determined using the rule of thumb proposed by Hair et al. (2021) and Memon et al. (2020), which recommends five to ten observations per indicator. With 20 measurement items, the minimum required sample size was set at 100 respondents. The variables measured in this study include:

1. Environmental Innovation (EI): adapted from Chen et al. (2006) and García-Granero et al. (2020), comprising five items focused on green product development, clean technologies, and emission reduction.
2. Sustainable Supply Chain Management (SSCM), adapted from Seuring and Müller (2008), consists of five items addressing sustainable procurement, supplier collaboration, sustainability information sharing, and reverse logistics.
3. Environmental, Social, and Governance (ESG): based on Oh et al. (2024), consisting of six items divided into three dimensions—environment (waste management, energy/water reporting), social (labor rights, community engagement), and governance (risk management, corporate transparency).
4. Financial Performance (FP): measured using four perceptual items based on self-reported trends in profitability, ROI, sales growth, and industry benchmarking.

Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the aid of SmartPLS software. The PLS-SEM technique was chosen for its suitability for exploratory models, prediction-oriented analysis, and its ability to handle complex models with moderating variables. The study involved two main stages (Hair et al., 2021):

1. Measurement model assessment: evaluating construct validity and reliability through composite reliability (CR), average variance extracted (AVE), and outer loadings.
2. Structural model assessment: examining the significance of hypothesized relationships using bootstrapped t-statistics and p-values. Path coefficients were interpreted alongside model fit indices, including the Standardized Root Mean Square Residual (SRMR), Normed Fit Index (NFI), and the d-ULS (discrepancy).

This methodological design ensures the reproducibility of the study. It provides a robust framework to test the moderating effect of ESG in the relationship between internal sustainability strategies and financial outcomes.

RESULTS

Profile Respondent

This study involved 100 respondents drawn from medium and large-scale enterprises actively engaged in sustainability initiatives, with a 100% response rate. These firms were selected based on their involvement in ESG reporting or certified environmental programs. Table 1 presents the classification of participating companies.

Table 1. Classification of Respondent Companies

Industry Sector	Percentage (%)
Manufacturing	35%
Agribusiness & FoodProcessing	20%
Energy and Utilities	15%
Logistics and Supply Chain	10%
Finance and Insurance	10%
Others (e.g., Technology, Retail)	10%
Total	100%

Sourced: Data processed, 2025

Most respondents held managerial roles related to operations, sustainability, and supply chain, ensuring they possessed adequate knowledge about the organizational sustainability strategies examined in this study.

Measurement Model Assessment

To assess the measurement model, several validity and reliability indicators were analyzed, including Outer Loadings, Cronbach's Alpha, rho_A, Composite Reliability (CR), Average Variance Extracted (AVE), and Variance Inflation Factor (VIF). The results of these analyses are presented in Table 2.

Table 2. First-order construct validation

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ESG	0.951	0.952	0.961	0.804
Environmental	0.955	0.956	0.965	0.848

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Innovation				
Financial Performance	0.931	0.933	0.951	0.830
Moderating ESG-Environmental Innovation	1.000	1.000	1.000	1.000
Moderating ESG-SSCM	1.000	1.000	1.000	1.000
Sustainable Supply Chain Management	0.955	0.956	0.965	0.848

Source: Data processed, 2025

The results demonstrate that all indicator loadings are above 0.70, suggesting acceptable indicator reliability (Hair et al., 2021). Furthermore, Cronbach's Alpha values exceed 0.6 for all constructs, indicating sufficient internal consistency (Ghozali, 2015). Composite Reliability and rho_A values are also within the acceptable threshold (> 0.7), confirming construct reliability. AVE values exceed the minimum threshold of 0.5, indicating good convergent validity.

Table 2. Fornell-Larcker criterion

	ESG	Environmental Innovation	Financial Performance	Moderating ESG-Environmental Innovation	Moderating ESG-SSCM	Sustainable Supply Chain Management
ESG	0.897					
Environmental Innovation	0.978	0.921				
Financial Performance	0.957	0.959	0.911			
Moderating ESG-Environmental Innovation	-0.027	-0.069	0.133	1.000		
Moderating ESG-SSCM	0.082	0.026	0.209	0.963	1.000	
Sustainable Supply Chain Management	0.955	0.954	0.919	0.031	0.154	0.921

Source: Data processed, 2025

Discriminant validity is also assessed using the Fornell-Larcker criterion (see Table 2). The square root of the AVE of each construct is greater than its highest correlation with any other construct, confirming satisfactory discriminant validity. This research also evaluated the coefficient of determination (R^2) and predictive relevance (Q^2) to determine the model's explanatory power. All endogenous constructs showed R^2 values exceeding 0.25, with Q^2 values > 0, indicating the model's predictive relevance (Hair et al., 2021).

Table 3. R-squared values

	R Square	R Square Adjusted
Financial Performance	0.968	0.967

Source: Data processed, 2025

Structural Model and Hypotheses Testing

The structural model was evaluated using bootstrapping with 5000 subsamples. The path coefficients and their t-statistics and p-values are summarized in Table 4.

Table 4. Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
H1. Environmental Innovation -> Financial Performance	0.805	0.798	0.107	7.522	0.000
H2. Sustainable Supply Chain Management -> Financial Performance	-0.218	-0.224	0.068	3.213	0.001
H3a. Moderating ESG-Environmental Innovation -> Financial Performance	0.404	0.408	0.110	3.658	0.000
H3b. Moderating ESG-SSCM -> Financial Performance	-0.140	-0.145	0.091	1.543	0.123

Source: Data processed, 2025

The results reveal that Environmental Innovation (EI) has a substantial and significant positive effect on Financial Performance (FP) (β = 0.805, p <0.001), supporting H1. Sustainable Supply Chain Management (SSCM) also significantly affects FP, albeit with a negative coefficient (β =-0.218, p = 0.001), supporting H2.

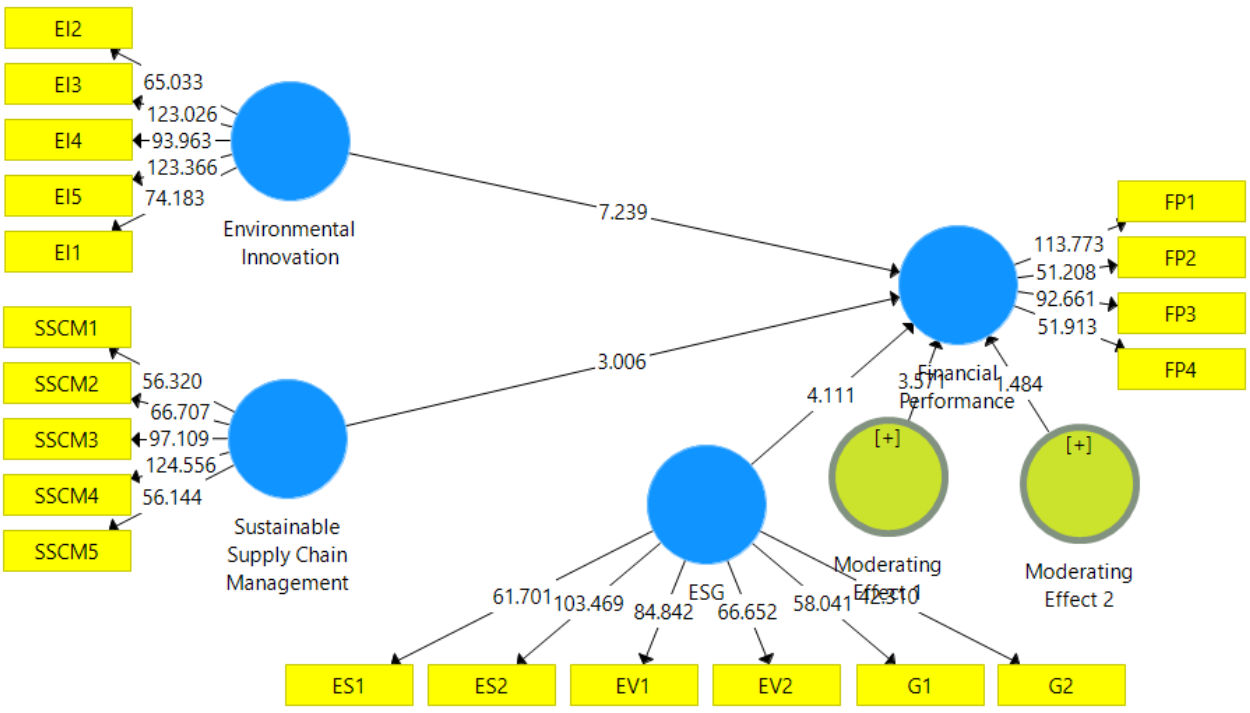

Figure 1. Path Analysis

Regarding moderation, ESG significantly strengthens the effect of EI on FP (H3a, $\beta = 0.404$, $p < 0.001$), indicating that ESG practices enhance the value of environmental innovation in delivering financial outcomes. However, the moderating effect of ESG on the relationship between SSCM and FP (H3b) is not statistically significant ($\beta = -0.140$, $p = 0.123$); hence, H3b is not supported. Additionally, the direct effect of ESG on FP is also statistically significant ($\beta = 0.397$, $p < 0.001$), highlighting its overall relevance in the strategic sustainability framework.

The R^2 value for Financial Performance is 0.714, indicating that the model explains approximately 71.4% of the variance in the endogenous construct. Furthermore, the Q^2 values for predictive relevance were all above zero, indicating adequate predictive power of the structural model.

Discussion

The findings of this study reinforce the strategic importance of sustainability-oriented practices—particularly environmental innovation and ESG governance—as mechanisms for improving corporate financial performance. Consistent with the Resource-Based View (RBV), environmental innovation strongly and positively influences financial outcomes, highlighting its role as a valuable internal capability. It supports prior research emphasizing that green innovation can reduce operating costs, enhance efficiency, and create differentiation in increasingly eco-conscious markets (Chen et al., 2006; Bitencourt et al., 2020; García-Granero et al., 2020).

The results highlight the dominant role of environmental innovation in driving financial performance. The positive moderation of ESG on this relationship further reinforces the value of ESG practices as amplifiers of innovation outcomes. Stakeholder Theory suggests that external governance mechanisms—such as ESG frameworks—can legitimize and magnify the business value of internal environmental strategies (Freeman et al., 2021; Velte, 2023). When firms institutionalize ESG practices—such as transparency, labor protection, and environmental risk mitigation—they create synergistic effects that strengthen innovation outcomes.

SSCM shows a significant but negative coefficient, suggesting potential inefficiencies or short-term costs associated with sustainable supply chain initiatives. While SSCM is often framed as a strategic asset (Gold et al., 2010; Kamble et al., 2018), its implementation may entail complex restructuring, higher supplier costs, or logistical burdens that suppress financial returns in the short term (Majumdar et al., 2021; Özbay, 2021). These findings offer a nuanced view, indicating that while SSCM aligns with long-term sustainability, it may introduce transitional financial pressures in its early stages.

Moreover, ESG does not significantly moderate the SSCM–performance link, implying that external ESG governance may not buffer the operational complexity inherent in SSCM strategies. Unlike its role in amplifying innovation outcomes, ESG mechanisms may not be sufficient to resolve the internal frictions or coordination challenges embedded in sustainable supply chains. It suggests that successful SSCM requires external legitimacy, internal process alignment, and capability development, especially in contexts where supply chain maturity is still evolving.

Finally, ESG shows a direct and significant positive effect on financial performance. Reinforces the growing consensus that firms with strong ESG performance are more likely to attract responsible investors, strengthen stakeholder trust, and exhibit long-term resilience (Duan et al., 2023; Shang, 2024). These findings confirm the dual role of ESG: not only as a moderator of internal strategies but also as an independent driver of financial outcomes.

CONCLUSION

This study explores how environmental innovation and sustainable supply chain management (SSCM) influence financial performance, and whether Environmental, Social, and Governance (ESG) practices serve as an effective moderating mechanism. Drawing on the Resource-Based View (RBV) and Stakeholder Theory, the findings confirm that environmental innovation significantly enhances financial outcomes, and that this effect is strengthened in organizations that institutionalize ESG

practices. In contrast, while SSCM is also statistically significant, it negatively affects financial performance, suggesting that implementing such strategies may involve short-term inefficiencies or resource constraints.

These findings provide both theoretical and practical contributions. The study reinforces the synergistic potential of combining internal capabilities (environmental innovation) with external legitimacy mechanisms (ESG) in the sustainability–performance link for scholars. The results also suggest that ESG is not a universal moderator and that its impact may vary depending on the implemented sustainability initiative. In practice, companies should prioritize environmental innovation as a high-leverage strategy to drive financial success, use ESG frameworks for compliance, and use them as strategic tools to maximize returns on sustainability investments. SSCM initiatives, while critical for long-term environmental outcomes, may require better internal integration and cost management strategies to be financially sustainable.

This study successfully answers the core research question by empirically validating the differentiated impacts of environmental innovation and SSCM, as well as the conditional role of ESG. However, limitations exist. The cross-sectional nature of the data limits the ability to infer long-term causal relationships. Additionally, the reliance on self-reported financial performance may introduce bias. Future research should consider longitudinal designs and explore mediating mechanisms such as innovation capability maturity or supply chain digitalization.

For practitioners, the findings suggest that not all sustainability practices yield immediate financial returns, and a more nuanced, capability-driven approach is essential. For the academic community, this study invites further examination into the contextual boundaries and operational conditions under which ESG governance interacts with internal sustainability strategies.

Recommendations

Based on the findings, several recommendations are proposed for business practitioners and policymakers:

1. Prioritize Environmental Innovation: Firms should continue investing in green technologies, eco-friendly product development, and emission-reducing processes as core drivers of sustainability and financial value.
2. Institutionalize ESG Governance: ESG principles should not be treated as peripheral reporting mechanisms but embedded into corporate decision-making to enhance innovation effectiveness and stakeholder engagement.
3. Integrate SSCM with Internal Capabilities: To overcome the short-term cost challenges associated with SSCM, companies should focus on internal alignment, supplier capacity building, and digital integration within their supply chains.
4. Tailor ESG-Supply Chain Synergies: Policymakers and industry leaders should develop sector-specific ESG guidelines that better support the operational execution of SSCM practices.
5. Consider a Phased Approach to SSCM Implementation: Especially in emerging economies, gradual implementation of SSCM—starting with low-cost, high-impact practices—may help minimize disruptions while building long-term capability.

Future research may expand this model by exploring sectoral differences and long-term financial impacts or integrating other moderating variables such as digital maturity or regulatory pressure.

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