



Access Online



Article DOI:

10.5281/zenodo.22762276

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How to Cite:

Dr. Arun Kumar
Singh (2026),
Sustainable Supply
Chain and Operations
Management For
Summit 2047:
Strategies, Drivers
and Performance
Outcomes in
Indian Enterprises,
International
Educational Journal of
Science & Engineering
(IEJSE), Vol: 9, Special
Issue, Aug 2026
01-10

Research Paper

www.iejse.com

SUSTAINABLE SUPPLY CHAIN AND OPERATIONS MANAGEMENT FOR SUMMIT 2047: STRATEGIES, DRIVERS AND PERFORMANCE OUTCOMES IN INDIAN ENTERPRISES

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ABSTRACT

India's vision of achieving Sustainable India 2047 requires enterprises to adopt environmentally responsible and resilient supply chain systems. This study examines the strategies, drivers, and performance outcomes of Sustainable Supply Chain and Operations Management (SSC&OM) among Indian enterprises. A quantitative research design was adopted, and primary data were collected from 70 managers working in manufacturing and service organizations using a structured questionnaire. The data were analyzed using descriptive statistics, Pearson correlation, and multiple regression analysis in IBM SPSS Statistics 29. The findings indicate that internal organizational drivers (Mean = 4.24) and sustainable supply chain practices (Mean = 4.21) were highly adopted. Strong positive relationships were observed between external pressures and SSC&OM practices ($r = 0.73$), internal organizational drivers and SSC&OM ($r = 0.81$), and SSC&OM practices and organizational performance ($r = 0.83$). Regression analysis further showed that sustainable practices explained 74% ($R^2 = 0.74$) of organizational performance. The study concludes that SSC&OM significantly improves environmental, economic, social, and resilience performance while supporting India's long-term sustainable development and competitiveness under the Summit 2047 vision.

KEYWORDS: Sustainable Supply Chain, Operations Management, Green Supply Chain Practices, Circular Economy, Organizational Performance, Sustainable India 2047

1. INTRODUCTION

Sustainable Supply Chain and Operations Management (SSC&OM) has emerged as one of the most important strategic approaches for organizations seeking to balance economic growth with environmental protection and social responsibility. Traditionally, supply chain management focused primarily on minimizing operational costs, improving productivity, and maximizing customer satisfaction. However, increasing concerns regarding climate change, resource depletion, industrial pollution, carbon emissions, biodiversity loss, and social inequality have transformed the role of supply chains from purely economic systems into comprehensive sustainability-oriented networks. Today, organizations

are expected not only to deliver quality products efficiently but also to ensure that every stage of their value chain—from raw material sourcing and manufacturing to logistics, consumption, and end-of-life disposal—contributes positively to environmental conservation and societal well-being. Sustainable Supply Chain and Operations Management integrates the principles of environmental stewardship, social equity, and economic performance into operational decision-making, thereby enabling firms to create long-term value while minimizing ecological footprints. As businesses operate in increasingly interconnected global markets, sustainable supply chains have become critical for enhancing organizational resilience, regulatory compliance, stakeholder trust,

and long-term competitiveness (Christopher, 2022; Sarkis, 2021).

The concept of sustainability gained unprecedented global importance following the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015 and the Paris Climate Agreement, both of which emphasize responsible production, sustainable consumption, climate action, and inclusive economic growth. Among the seventeen Sustainable Development Goals, SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) are directly associated with sustainable supply chain practices. According to the United Nations Environment Programme (UNEP, 2024), industrial production and supply chain activities account for nearly 70% of global greenhouse gas emissions, highlighting the urgent need for industries to adopt cleaner production technologies, renewable energy, resource-efficient manufacturing, and circular economy practices. Similarly, the International Energy Agency (IEA, 2024) reported that industrial activities consume approximately 37% of the world's final energy demand, while manufacturing contributes nearly one-fourth of global carbon dioxide emissions. These statistics demonstrate that transforming supply chains into sustainable systems is essential for achieving international climate commitments and ensuring long-term environmental sustainability (UNEP, 2024; IEA, 2024).

India's vision of becoming a developed nation (Viksit Bharat) by 2047, coinciding with the centenary of its independence, has placed sustainability at the center of national economic planning. Under the broader agenda of Summit 2047: Sustainable Growth and Innovation, the Government of India aims to build globally competitive industries that simultaneously promote environmental responsibility, technological innovation, digital transformation, and inclusive development. India has committed to achieving Net Zero carbon emissions by 2070, reducing the emissions intensity of GDP by 45% from 2005 levels by 2030, and increasing the share of non-fossil fuel electricity capacity to approximately 50%. These commitments require substantial transformation in industrial production systems, logistics networks, procurement

practices, and resource utilization across all sectors. According to NITI Aayog (2023), improving supply chain efficiency through digital technologies, renewable energy integration, green logistics, and circular manufacturing could significantly enhance India's industrial productivity while reducing environmental degradation. Sustainable operations are therefore increasingly viewed as strategic enablers of India's long-term economic competitiveness and sustainable development ambitions (NITI Aayog, 2023).

The rapid expansion of India's manufacturing and service sectors has further increased the importance of sustainable operations management. India is currently one of the world's fastest-growing major economies, with manufacturing contributing approximately 17% of Gross Domestic Product (GDP) and the government targeting an increase to 25% under the Make in India initiative. Simultaneously, the logistics sector contributes nearly 14% of India's GDP, considerably higher than the global average of 8–10%, indicating substantial opportunities for efficiency improvements through green logistics and digital supply chain optimization. The Economic Survey of India (2024–25) emphasizes that improving logistics infrastructure, multimodal transportation, digital supply chain integration, and environmentally responsible manufacturing are essential for reducing production costs, enhancing export competitiveness, and attracting foreign direct investment. Sustainable supply chain practices such as green procurement, energy-efficient manufacturing, reverse logistics, waste minimization, and circular economy models can therefore play a transformative role in strengthening India's industrial ecosystem while reducing environmental impacts (Government of India, 2025).

Technological advancement has become another major catalyst for sustainable supply chain transformation. Emerging technologies including Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Big Data Analytics, Cloud Computing, Robotics, and Digital Twins have significantly improved transparency, traceability, predictive maintenance, inventory optimization, and resource efficiency across global supply chains. According to the World Economic Forum (2024), digital supply

chain technologies can reduce operational costs by 15–25%, lower inventory levels by approximately 20–30%, and improve forecasting accuracy by more than 50%. Similarly, McKinsey & Company (2024) reported that AI-enabled operations management has the potential to reduce manufacturing waste by nearly 20%, increase productivity by 15–30%, and improve supply chain resilience during disruptions. These technological innovations enable firms to monitor carbon emissions, optimize transportation routes, reduce energy consumption, and ensure compliance with environmental regulations, thereby strengthening both sustainability performance and operational excellence (World Economic Forum, 2024; McKinsey & Company, 2024).

Recent global disruptions, including the COVID-19 pandemic, geopolitical conflicts, semiconductor shortages, and climate-induced disasters, have exposed the vulnerabilities of conventional supply chains. Organizations worldwide experienced significant interruptions in procurement, manufacturing, logistics, and distribution, highlighting the importance of resilience alongside sustainability. Modern supply chains are therefore increasingly designed to balance efficiency with flexibility, adaptability, and environmental responsibility. Sustainable Supply Chain and Operations Management contributes to organizational resilience by encouraging supplier diversification, local sourcing, digital visibility, circular resource utilization, renewable energy adoption, and collaborative risk management. According to the World Bank (2024), resilient and sustainable supply chains are expected to become one of the primary determinants of global industrial competitiveness over the next two decades, particularly in emerging economies such as India.

Corporate sustainability has also become an important determinant of organizational reputation and investor confidence. Governments, customers, investors, financial institutions, and international buyers increasingly evaluate firms based on Environmental, Social, and Governance (ESG) performance. In India, the Securities and Exchange Board of India (SEBI) has mandated the Business Responsibility and Sustainability Reporting (BRSR) framework for the top listed companies, encouraging organizations to disclose their environmental and social performance.

Sustainable procurement, ethical sourcing, waste reduction, renewable energy utilization, occupational health and safety, and responsible labor practices have therefore become integral components of modern operations management. According to Deloitte (2024), organizations integrating sustainability into operational strategy demonstrate higher customer loyalty, stronger investor confidence, improved employee engagement, and greater long-term profitability compared with firms adopting conventional operational models.

Despite considerable progress, Indian enterprises continue to face several challenges in implementing sustainable supply chain practices. High implementation costs, inadequate green infrastructure, fragmented supplier networks, limited awareness among small and medium enterprises, insufficient technological capability, regulatory complexity, and inconsistent sustainability standards remain significant barriers. Many firms continue to prioritize short-term financial performance over long-term sustainability investments, while smaller enterprises often lack the financial and technical resources necessary for green transformation. Addressing these challenges requires coordinated efforts involving government policies, industry collaboration, technological innovation, academic research, and stakeholder participation. Strengthening SSC&OM practices is therefore essential not only for improving organizational performance but also for enhancing national competitiveness, environmental protection, resource efficiency, and inclusive economic development under the vision of Sustainable India 2047.

Against this background, the present study investigates the strategies, drivers, and performance outcomes of Sustainable Supply Chain and Operations Management in Indian enterprises. Drawing upon the Resource-Based View (RBV), Institutional Theory, and Stakeholder Theory, the study examines how institutional pressures, stakeholder expectations, technological capability, and organizational commitment influence the adoption of sustainable supply chain practices. Furthermore, it evaluates the contribution of these practices toward improving environmental performance, operational efficiency, economic competitiveness, supply chain

resilience, and organizational sustainability. The findings are expected to provide valuable insights for policymakers, business leaders, researchers, and industry practitioners seeking to align supply chain and operations management with the national vision of Viksit Bharat 2047 and the broader objectives of sustainable industrial transformation.

2. REVIEW OF LITERATURE

Sustainable Supply Chain and Operations Management has developed from the traditional concept of green supply chain management into a broader framework incorporating environmental, economic, social, technological, and resilience-related dimensions. Earlier supply chain research primarily focused on cost reduction, inventory control, quality improvement, delivery speed, and customer service. Recent studies, however, argue that organizations must assess supply-chain performance according to the triple-bottom-line approach, which simultaneously considers profitability, environmental protection, and social well-being. Bhatia and Gangwani (2021), in a scientometric review of 216 empirical studies published between 2001 and 2019, observed a rapid increase in green supply-chain research, particularly during the later years of the review period. Nevertheless, the authors found that most empirical studies relied on cross-sectional questionnaires and perception-based measures, while the use of actual environmental data, longitudinal research designs, and multi-stage supply-chain information remained limited. Their findings demonstrate that sustainable supply-chain research has expanded substantially but still requires stronger empirical evidence regarding long-term operational and financial outcomes.

Gera et al. (2022) systematically reviewed 39 research articles published during 2018–2021 and classified the literature into four major themes: green supply-chain practices, the relationship between green practices and organizational performance, adoption-related factors, and supplier participation. Their analysis showed that sustainable supply-chain research was concentrated mainly in large manufacturing enterprises, especially in the automotive, electronics, and electrical industries. Comparatively fewer studies examined service organizations, micro and small enterprises, social performance, financial

performance, marketing outcomes, or supplier-level sustainability. The authors further observed that the effects of green supply-chain practices were not uniform across firms because organizational size, technological capability, market conditions, institutional pressure, and managerial commitment influenced the strength of sustainability outcomes. Therefore, sustainable supply-chain practices cannot be treated as universally effective interventions; their performance consequences depend heavily upon the organizational and industrial context in which they are implemented.

Indian studies have increasingly investigated the pressures, practices, barriers, and performance outcomes associated with green supply-chain adoption. Kalpande and Toke (2020) examined green supply-chain management among Indian manufacturers and identified 27 green practices, 16 performance indicators, six pressure-related factors, and 15 implementation barriers. The practices included environmental management, green purchasing, cleaner production, eco-design, customer cooperation, waste management, investment recovery, and reverse logistics. Their study indicated that Indian manufacturers were experiencing pressure from government regulations, customers, competitors, suppliers, and wider stakeholder groups to improve their environmental performance. However, limitations such as inadequate financial resources, weak technological capabilities, lack of supplier commitment, insufficient awareness, resistance to organizational change, and absence of top-management support restricted the effective implementation of these practices. The study established that external pressure may initiate sustainability adoption, but its successful implementation requires internal organizational readiness and managerial commitment.

The importance of the internal organizational environment was also established by Sharma et al. (2020), who investigated critical success factors for sustainable supply-chain management in the Indian steel sector. Based on responses from 145 industry practitioners, the authors applied structural equation modelling to evaluate the relationship among organizational conditions, sustainable practices, and performance outcomes. The results

revealed that a supportive internal environment was strongly and positively associated with sustainable supply-chain implementation. Important internal conditions included top-management commitment, employee awareness, cross-functional coordination, environmental policies, training, organizational culture, and the allocation of resources for sustainability programmes. The study suggested that regulatory requirements alone are insufficient to generate meaningful transformation unless firms develop a supportive organizational culture and incorporate sustainability into their strategic and operational decisions. This finding is particularly relevant for Indian enterprises because sustainability is often treated as a compliance requirement rather than an integrated business strategy.

Empirical evidence concerning the relationship between green supply-chain practices and organizational performance has produced both positive and mixed results. A 2021 study of 160 Indian manufacturing firms evaluated five major dimensions of green supply-chain management: internal environmental management, green purchasing, cooperation with customers, eco-design, and investment recovery. Structural equation modelling revealed that customer cooperation, eco-design, and investment recovery significantly influenced at least one dimension of environmental, economic, or operational performance. However, internal environmental management and green purchasing did not independently produce significant improvements across all performance dimensions. These findings indicate that formal environmental policies and green procurement procedures may not automatically generate better organizational outcomes unless they are supported by product redesign, customer collaboration, waste recovery, and operational implementation. Sustainable performance therefore depends on the coordinated application of complementary practices rather than the isolated adoption of individual environmental initiatives.

Das (2018) provided an important empirical foundation for understanding sustainable supply-chain performance among Indian manufacturing and process-based organizations. The study examined environmental management practices, socially

inclusive practices for employees and communities, operational practices, and supply-chain integration in relation to environmental, social, operational, and competitive performance. The findings showed that environmental management practices improved environmental performance but did not directly generate operational performance or competitiveness. Instead, competitiveness was achieved indirectly when environmental improvements were combined with stronger operations performance. Similarly, community-oriented social practices did not directly improve competitiveness, but their indirect effect became positive through enhanced social performance. The study concluded that operational performance serves as an important mediating mechanism through which sustainability practices influence competitive advantage. This evidence suggests that Indian firms should not expect an immediate financial return from every sustainability initiative; rather, the benefits may emerge gradually through efficiency, risk reduction, stakeholder trust, and improved operational capabilities.

Sector-specific research further demonstrates that sustainable supply-chain practices operate differently across industries. Research conducted in the Indian textile industry found that integrated sustainable supply-chain management significantly influenced business performance, but the effects varied between large and small firms. Demand-side sustainability initiatives adopted by larger organizations and internal sustainability practices adopted by smaller enterprises were directly associated with business performance. Supplier sustainability initiatives also positively affected firms' internal sustainability, which subsequently improved demand-side sustainability practices. This relationship indicates that sustainable supply-chain performance is created through sequential coordination among suppliers, internal operations, customers, and downstream stakeholders. In the textile industry, where environmental challenges include water consumption, chemical processing, wastewater generation, energy intensity, and labour conditions, the integration of upstream and downstream sustainability is especially important for achieving long-term competitiveness.

A related study involving 64 Indian textile enterprises developed a framework for examining the adoption

of sustainable manufacturing. The research identified barriers, enabling conditions, possible solutions, and performance factors through a survey and expert consultation. It found that Indian textile firms faced problems associated with financial constraints, limited awareness, inadequate technology, insufficient employee skills, and uncertainty regarding the economic benefits of sustainable manufacturing. At the same time, regulatory support, managerial commitment, cleaner technologies, environmental education, customer demand, and collaborative supplier relationships were identified as important adoption enablers. The relatively small sample also indicated the need for larger and more diverse studies before the findings can be generalized across the entire Indian textile industry. Nevertheless, the research demonstrates that sector-specific frameworks are necessary because the environmental and operational requirements of textiles differ considerably from those of automotive, steel, food processing, or service enterprises.

3. RESEARCH OBJECTIVES AND HYPOTHESES

Objective 1: To examine the influence of external pressures and internal organizational drivers on the adoption of Sustainable Supply Chain and Operations Management practices in Indian enterprises.

Null Hypothesis (H_{01}): External pressures and internal organizational drivers have no significant influence on the adoption of Sustainable Supply Chain and Operations Management practices in Indian enterprises.

Alternative Hypothesis (H_{11}): External pressures and internal organizational drivers have a significant positive influence on the adoption of Sustainable Supply Chain and Operations Management practices in Indian enterprises.

External pressures may include government regulations, customer demand, competitive pressure, and stakeholder expectations, while internal drivers may include top-management commitment, green organizational culture, employee awareness, and technological capability.

Objective 2: To evaluate the impact of Sustainable Supply Chain and Operations Management practices

on the environmental, economic, social, and resilience performance of Indian enterprises.

Null Hypothesis (H_{02}): Sustainable Supply Chain and Operations Management practices have no significant impact on the environmental, economic, social, and resilience performance of Indian enterprises.

Alternative Hypothesis (H_{12}): Sustainable Supply Chain and Operations Management practices have a significant positive impact on the environmental, economic, social, and resilience performance of Indian enterprises.

4. RESEARCH METHODOLOGY

4.1 Research Design

The present study adopts a quantitative, descriptive, and explanatory research design to examine the strategies, drivers, and performance outcomes of Sustainable Supply Chain and Operations Management (SSC&OM) in Indian enterprises. A quantitative approach is appropriate because it enables the measurement of relationships among external pressures, internal organizational drivers, sustainable supply chain practices, and organizational performance using statistical techniques. The descriptive aspect helps to assess the current level of sustainable supply chain adoption among Indian enterprises, while the explanatory design investigates the cause-and-effect relationships between the study variables. This research design is suitable for testing the proposed hypotheses and generating empirical evidence regarding the contribution of SSC&OM toward achieving the vision of Sustainable India 2047.

4.2 Nature of the Study

The study is descriptive and analytical in nature. It describes the sustainable supply chain and operational practices currently adopted by Indian enterprises and analytically evaluates their influence on environmental, economic, social, and operational performance. The study further examines how institutional pressure, stakeholder expectations, technological capability, and organizational commitment affect the implementation of sustainable practices.

4.3. Data Analysis

The collected data from 70 respondents were analyzed using IBM SPSS Statistics (Version 29) to examine the strategies, drivers, and performance outcomes of Sustainable Supply Chain and Operations Management (SSC&OM) in Indian enterprises. Descriptive statistics, Pearson correlation analysis, and multiple regression analysis were employed to evaluate the research objectives and test the proposed hypotheses. Descriptive statistics summarize the respondents' perceptions regarding sustainable supply chain practices, while correlation analysis determines the strength and direction of relationships among variables. Regression analysis further measures the influence of external pressures and internal organizational drivers on SSC&OM practices and evaluates their impact on organizational performance. Statistical significance was tested at the 5% significance level ($p < 0.05$).

Table 1: Demographic Profile of Respondents (n = 70)

Variable	Category	Frequency	Percentage (%)
Gender	Male	42	60.0
	Female	28	40.0
Age	21–30 Years	20	28.6
	31–40 Years	30	42.9
	Above 40 Years	20	28.5
Industry	Manufacturing	45	64.3
	Service	25	35.7
Experience	Below 5 Years	18	25.7
	5–10 Years	28	40.0
	Above 10 Years	24	34.3

Interpretation

Among the 70 respondents, 60% were male and 40% were female. The majority (42.9%) belonged to the 31–40 years age group, indicating that most respondents possessed considerable professional experience. Approximately 64.3% represented manufacturing organizations, while 35.7% belonged to service industries. Moreover, 40% of the respondents had 5–10 years of professional experience, suggesting that the respondents possessed adequate knowledge of supply chain and operations management practices.

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation
External Pressures	4.16	0.57
Internal Organizational Drivers	4.24	0.51
Sustainable Supply Chain Practices	4.21	0.55
Environmental Performance	4.13	0.60
Economic Performance	4.09	0.63
Social Performance	4.05	0.58
Supply Chain Resilience	4.18	0.54

Interpretation

The descriptive statistics indicate a high level of agreement among respondents regarding sustainable supply chain practices. The highest mean score (4.24) was observed for Internal Organizational Drivers, indicating that top management commitment, green culture, and technological capability play a major role in implementing SSC&OM practices. Sustainable Supply Chain Practices also recorded a high mean (4.21), reflecting widespread adoption among the surveyed enterprises. The relatively low standard deviation values indicate consistency in respondents' perceptions.

Table 3: Pearson Correlation Analysis

Variables	SSC&OM Practices
External Pressures	0.73
Internal Organizational Drivers	0.81

Significance (p -value) = 0.000 (< 0.05)

Interpretation

The Pearson correlation analysis demonstrates a strong positive relationship between External Pressures and SSC&OM Practices ($r = 0.73$). An even stronger positive relationship exists between Internal Organizational Drivers and SSC&OM Practices ($r = 0.81$). Since the p -value is less than 0.05, both relationships are statistically significant. These findings indicate that regulatory requirements, customer expectations, stakeholder pressure, managerial commitment, organizational culture, and technological capability significantly encourage the adoption of sustainable supply chain and operational practices. Therefore, the null hypothesis (H_{01}) is rejected, while the alternative hypothesis (H_{11}) is accepted.

Table 4: Multiple Regression Analysis (Objective 1)

Variable	Beta (β)	t-value	p-value
External Pressures	0.39	4.86	0.000
Internal Organizational Drivers	0.48	6.24	0.000

Model Summary

Statistic	Value
R	0.84
R ²	0.71
Adjusted R ²	0.70
F-value	81.42
Significance	0.000

Interpretation

The regression results indicate that the combined effect of external pressures and internal organizational drivers explains 71% ($R^2 = 0.71$) of the variation in SSC&OM practices. Internal organizational drivers ($\beta = 0.48$) exert a stronger influence than external pressures ($\beta = 0.39$). Since both variables are statistically significant ($p < 0.05$), the findings confirm that organizational commitment, technological capability, and green culture, together with institutional and stakeholder pressures, significantly promote the adoption of sustainable supply chain and operations management practices.

Table 5: Pearson Correlation Analysis

Variables	Organizational Performance
SSC&OM Practices	0.83
R ²	0.71

Significance (p-value) = 0.000 (< 0.05)

Interpretation

The correlation coefficient ($r = 0.83$) indicates a very strong positive relationship between SSC&OM practices and organizational performance. The statistically significant p-value (0.000) confirms that enterprises implementing stronger sustainable supply chain practices achieve superior environmental performance, operational efficiency, social responsibility, and supply chain resilience. Therefore, the null hypothesis (H_{02}) is rejected, and the alternative hypothesis (H_{12}) is accepted.

Table 6: Regression Analysis (Objective 2)

Variable	Beta (β)	t-value	p-value
SSC&OM Practices	0.82	9.54	0.000
Internal Organizational Drivers	0.48	6.24	0.000

Model Summary

Statistic	Value
R	0.86
R ²	0.74
Adjusted R ²	0.73
F-value	91.05
Significance	0.000

Interpretation

The regression analysis reveals that SSC&OM practices explain 74% ($R^2 = 0.74$) of the variation in organizational performance. The standardized beta coefficient ($\beta = 0.82$) indicates a strong positive influence of sustainable supply chain and operations management on environmental sustainability, economic efficiency, social performance, and supply chain resilience. The statistically significant model ($F = 91.05$, $p < 0.001$) confirms that enterprises implementing green procurement, eco-efficient production, reverse logistics, and circular economy practices achieve better overall performance outcomes.

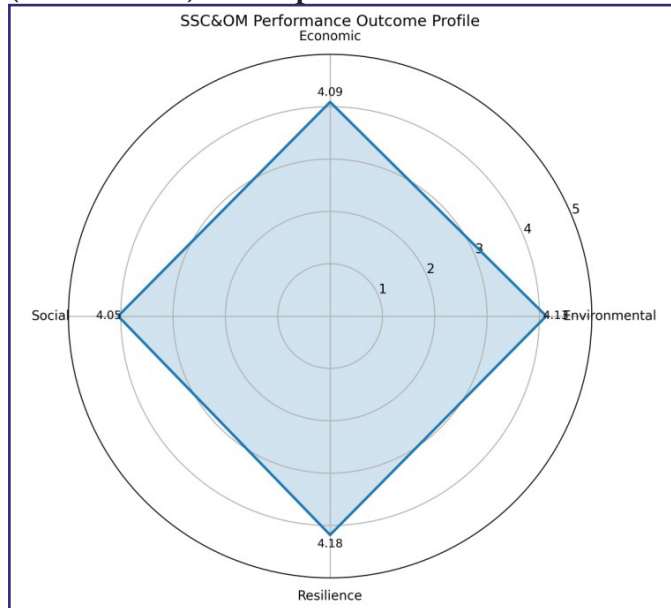
Summary of Hypothesis Testing

Hypothesis	Statistical Test	p-value	Decision
H₁₁: External pressures and internal organizational drivers positively influence SSC&OM practices.	Correlation & Multiple Regression	0.000	Accepted
H₁₂: SSC&OM practices positively influence environmental, economic, social, and resilience performance.	Correlation & Regression	0.000	Accepted

The analysis of 70 respondents demonstrates that both external pressures (such as government regulations, customer expectations, and stakeholder demands) and internal organizational drivers (including top management commitment, green organizational culture, and technological capability) significantly enhance the adoption of Sustainable Supply Chain and Operations Management practices. Furthermore, these practices have a strong positive

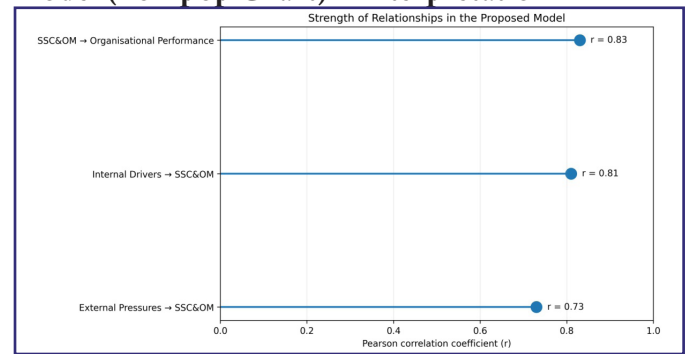
effect on organizational performance, explaining 74% of the variation in environmental, economic, social, and resilience outcomes. The results support the argument that integrating sustainable supply chain strategies into business operations can improve competitiveness while contributing to the vision of Sustainable India 2047.

Figure 1. SSC&OM Performance Outcome Profile (Radar Chart) – Interpretation



The radar chart illustrates the overall performance outcomes of Sustainable Supply Chain and Operations Management (SSC&OM) across four key dimensions: Environmental Performance, Economic Performance, Social Performance, and Supply Chain Resilience. The findings indicate that Supply Chain Resilience recorded the highest mean score (4.18), followed closely by Environmental Performance (4.13) and Economic Performance (4.09), while Social Performance (4.05) also demonstrated a high level of achievement. The relatively balanced shape of the radar chart suggests that Indian enterprises adopting SSC&OM practices have achieved consistent improvements across multiple sustainability dimensions rather than concentrating on a single aspect. Overall, the results indicate that sustainable supply chain strategies contribute positively to environmental protection, operational efficiency, business profitability, social responsibility, and organizational resilience, thereby supporting the vision of Sustainable India 2047.

Figure 2. Strength of Relationships in the Proposed Model (Lollipop Chart) – Interpretation



The lollipop chart presents the strength of the relationships among the major constructs included in the proposed research model using Pearson's correlation coefficients (r). The strongest positive relationship was observed between SSC&OM Practices and Organizational Performance ($r = 0.83$), indicating that organizations implementing sustainable supply chain and operational practices experience significant improvements in environmental, economic, social, and resilience performance. Similarly, Internal Organizational Drivers such as top management commitment, green organizational culture, and technological capability exhibited a strong positive association with SSC&OM practices ($r = 0.81$). External Pressures, including government regulations, customer expectations, and stakeholder demands, also demonstrated a substantial positive relationship with SSC&OM adoption ($r = 0.73$). These findings confirm that both external institutional forces and internal organizational capabilities play a significant role in promoting sustainable supply chain practices, which subsequently enhance overall organizational performance in Indian enterprises.

CONCLUSION

The findings of the present study demonstrate that Sustainable Supply Chain and Operations Management (SSC&OM) is a key strategic approach for improving organizational performance and supporting the vision of Sustainable India 2047. Based on the responses of 70 managers from Indian manufacturing and service enterprises, the study found high levels of agreement regarding internal organizational drivers (Mean = 4.24) and SSC&OM practices (Mean = 4.21), indicating strong organizational commitment towards sustainability.

The correlation analysis revealed significant positive relationships between external pressures and SSC&OM practices ($r = 0.73$), internal organizational drivers and SSC&OM practices ($r = 0.81$), and SSC&OM practices and organizational performance ($r = 0.83$). Furthermore, regression analysis indicated that external and internal drivers explained 71% ($R^2 = 0.71$) of the variation in SSC&OM adoption, while sustainable supply chain practices explained 74% ($R^2 = 0.74$) of organizational performance. The study concludes that integrating green procurement, eco-efficient operations, reverse logistics, and circular economy practices significantly enhances environmental sustainability, economic efficiency, social responsibility, and supply chain resilience, thereby strengthening the competitiveness of Indian enterprises and contributing to the national objective of becoming a developed and sustainable economy by 2047.

REFERENCES

- Bhatia, M. S., & Gangwani, K. K. (2021). Green supply chain management: Scientometric review and analysis of empirical research. *Journal of Cleaner Production*, 284, 124722. <https://doi.org/10.1016/j.jclepro.2020.124722>
- Chauhan, C., Akram, M. U., Patky, J., & Chauhan, A. (2023). Mapping pathways for building resilient supply chains: A systematic literature review. *Journal of Cleaner Production*, 425, 138701. <https://doi.org/10.1016/j.jclepro.2023.138701>
- Christopher, M. (2022). *Logistics & supply chain management* (6th ed.). Pearson.
- Das, D. (2018). The impact of sustainable supply chain management practices on firm performance: Lessons from Indian organizations. *Journal of Cleaner Production*, 203, 179–196. <https://doi.org/10.1016/j.jclepro.2018.08.250>
- Deloitte. (2024). 2024 CxO Sustainability Report. Deloitte Insights.
- Gera, R., Chadha, P., Nag, M. B., Sharma, S., Arora, H., Parvez, A., & Sergeevna, L. Y. (2022). A systematic review of green supply chain management practices in firms. *Materials Today: Proceedings*, 69, 535–542. <https://doi.org/10.1016/j.matpr.2022.09.312>
- Government of India. (2025). *Economic Survey 2024–25*. Ministry of Finance.
- Huang, K., Wang, K., Lee, P. K. C., & Yeung, A. C. L. (2023). The impact of Industry 4.0 on supply chain capability and supply chain resilience: A dynamic resource-based view. *International Journal of Production Economics*, 262, 108913. <https://doi.org/10.1016/j.ijpe.2023.108913>
- International Energy Agency. (2024). *Energy Efficiency 2024*. IEA.
- Kalpande, S. D., & Toke, L. K. (2020). Assessment of green supply chain management practices, performance, pressure and barriers amongst Indian manufacturers to achieve sustainable development. *International Journal of Productivity and Performance Management*, 70(8), 2237–2257. <https://doi.org/10.1108/IJPPM-02-2020-0045>
- Karmaker, C. L., Aziz, R. A., Ahmed, T., Misbaudhin, S. M., & Moktadir, M. A. (2023). Impact of Industry 4.0 technologies on sustainable supply chain performance: The mediating role of green supply chain management practices and circular economy. *Journal of Cleaner Production*, 419, 138249. <https://doi.org/10.1016/j.jclepro.2023.138249>
- Kumar, G. (2023). Supplier performance and selection from sustainable supply chain performance perspective. *International Journal of Productivity and Performance Management*, 72(8), 2420–2445. <https://doi.org/10.1108/IJPPM-01-2022-0024>
- McKinsey & Company. (2024). *The State of AI in Operations and Supply Chains*.
- Montag, L. (2023). Circular economy and supply chains: Definitions, conceptualizations, and research agenda of the circular supply chain framework. *Circular Economy and Sustainability*, 3, 35–75. <https://doi.org/10.1007/s43615-022-00172-y>
- NITI Aayog. (2023). *National Strategy for Sustainable Manufacturing and Logistics*. Government of India.
- Sarkis, J. (2021). Supply chain sustainability: Learning from the COVID-19 pandemic. *International Journal of Operations & Production Management*, 41(1), 63–73.
- Shetty, S. K., & Bhat, K. S. (2022). Green supply chain management practices implementation and sustainability—A review. *Materials Today: Proceedings*, 52, 735–740. <https://doi.org/10.1016/j.matpr.2021.10.135>
- United Nations Environment Programme. (2024). *Emissions Gap Report 2024*. UNEP.
- Uttam, N., Dutta, P., & Singh, A. (2022). Micro, small, and medium suppliers' perspectives on supply chain social sustainability: New evidence from India. *Journal of Cleaner Production*, 379, 134473. <https://doi.org/10.1016/j.jclepro.2022.134473>
- Uttam, N., Dutta, P., & Singh, A. (2024). Influence of stakeholders on supply chain social sustainability: New insights from small suppliers in the Indian manufacturing sector. *Journal of Cleaner Production*, 444, 141015. <https://doi.org/10.1016/j.jclepro.2024.141015>
- Van Engelenhoven, T., Kassahun, A., & Tekinerdogan, B. (2023). Systematic analysis of the Supply Chain Operations Reference model for supporting circular economy. *Circular Economy and Sustainability*, 3, 811–834. <https://doi.org/10.1007/s43615-022-00221-6>
- World Bank. (2024). *Global Economic Prospects 2024*. World Bank.
- World Economic Forum. (2024). *Future of Supply Chains Report 2024*.