

Green Efficiency in Motion: A Bibliometric Analysis of Sustainable Supply Chain Performance in the Indian FMCG Industry

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Abstract

This study conducts a comprehensive bibliometric analysis of *Sustainable Supply Chain Performance* in India's *Fast-Moving Consumer Goods* (FMCG) sector to map its intellectual structure, thematic evolution, and research trends. Using the SCOPUS database, 55 documents published between 1998 and 2025 were analysed using performance and thematic mapping techniques. The results revealed a steady annual growth rate of 7.47%, reflecting growing academic and industrial interest in sustainable supply chains. The research identifies leading contributors, including prominent authors such as Prajapati, Pratap, and Prashar, and top institutions such as the Symbiosis Centre for Management and Human Resource Development and the Management Development Institute. Thematic clustering highlights six major research areas: supply chain efficiency, circular economy and sustainability, technology and analytics, corporate responsibility, consumer-centric sustainability and market competitiveness. Despite increasing scholarly attention, research remains fragmented, with limited empirical studies integrating sustainability metrics, digital technology validation, and rural supply chain contexts. This study suggests future directions focusing on hybrid performance frameworks that combine efficiency and sustainability, AI-driven monitoring systems, and inclusive rural supply chain models. Overall, this bibliometric study advances the understanding of sustainability in India's FMCG sector by identifying intellectual trends and research gaps and providing actionable insights for academia, policymakers, and industry stakeholders working toward SDG 12 and India's ESG and BRSR goals.

Keywords:

Sustainable Supply Chain Performance (SSCP), Fast-Moving Consumer Goods (FMCG), Bibliometric Analysis, Circular Economy, Environmental, Social, and Governance (ESG)

1. Introduction

The Fast-Moving Consumer Goods (FMCG) sector in India drives economic growth and significantly influences consumer behaviour and market trends (Vuong et al., 2024). Its broad reach extends from urban centres to rural areas, making it an important part of the country's retail landscape. The sector's ability to respond to changing consumer preferences and its use of innovative marketing strategies have resulted in steady growth, even during tough economic times. Furthermore, the FMCG industry has led the way in adopting digital technologies, including e-commerce platforms and data-driven supply chain management, which have enhanced its efficiency and market reach (IBEF, 2024).

However, the rapid growth and wide-ranging operations of the FMCG sector have raised serious sustainability concerns. The industry's dependence on packaging materials, especially single-use plastics, significantly contributes to environmental pollution (Abatan et al., 2024). In addition, complex supply chains often involve many intermediaries, which leads to larger carbon footprints and possible inefficiencies. As consumers become more aware of environmental issues, FMCG companies face increasing pressure to adopt sustainable practices throughout their supply chains. This includes responsibly sourcing raw materials, improving transportation networks, and creating eco-friendly packaging materials. The challenge for the sector is to balance these sustainability goals with the need for cost-effectiveness and consumer convenience (Joshi & Rahman, 2015).

The extensive supply chains in the FMCG sector create various sustainability challenges that extend beyond environmental issues. The heavy use of single-use packaging, often made from non-biodegradable materials, greatly contributes to the global solid waste problem (Kumar et al., 2020). This situation is worsened by the large logistics network in the sector. These networks not only increase carbon emissions from transportation but also raise concerns about energy efficiency in warehouses and distribution centers (Singh et al., 2021). Additionally, sourcing raw materials ethically remains a crucial issue, involving fair labour practices, sustainable farming, and responsible resource extraction. These challenges highlight the complex social and environmental vulnerabilities of FMCG supply chains (Carter and Easton, 2011). To address these issues, FMCG companies are increasingly recognising the need for organised methods to assess and improve their supply chain performance. Measuring sustainable supply chain performance (SSCP) has become a key strategy that helps firms boost their operational efficiency while supporting global sustainability. This effort aligns with the United Nations' Sustainable Development Goal 12, which focuses on responsible consumption and production, and coincides with India's emerging environmental, social, and governance (ESG) standards (United Nations, 2015; SEBI, 2023). By using solid SSCP metrics, FMCG companies can identify areas for improvement, set meaningful sustainability targets, and demonstrate their commitment to stakeholders. This approach to supply chain management is becoming increasingly important as consumers, investors, and regulators demand more corporate responsibility in the FMCG sector.

The lack of representation of the Indian FMCG industry in bibliometric studies on supply chains reveals a significant gap in the literature. While global research on sustainable supply chains has

grown considerably (Carter and Rogers 2008; Seuring and Müller 2008), the Indian FMCG sector has not received sufficient attention. This gap is particularly important because the Indian market presents unique challenges and opportunities, including a large population, diverse consumer base, and rapidly changing regulatory environment. Existing studies have largely addressed broader sustainability topics such as green supply chains, circular economy initiatives, and sustainable manufacturing practices (Dubey et al., 2017; Gupta & Singh, 2020). However, these findings often overlook the specific characteristics of the FMCG sector, which is known for its high-volume production, short product life cycles, and complex distribution networks. Conducting a focused bibliometric study on SSCP in India would fill this knowledge gap and offer valuable insights into the sector's intellectual and thematic growth. Such research can guide policy choices, shape industry practices, and contribute to the broader conversation on sustainability in developing markets.

This study addresses this gap by performing a detailed bibliometric analysis of sustainable supply chain performance in the Indian FMCG industry. It addresses four main questions.

1. What is the trend in research output on SSCP in India's FMCG industry?
2. Who are the leading authors, institutions, and journals in this field?
3. What are the most influential themes, keywords, and emerging clusters?

This study contributes to both academic research and industry practices by providing a clear overview of research progress and suggesting future directions for sustainability in one of India's most dynamic industries.

The remainder of this paper is organised as follows: the next section discusses the methodology. The findings on research output are then explained. Finally, the conclusion presents the research implications.

2. Methodology

2.1 Bibliometric analysis

This study uses bibliometric analysis to examine the intellectual structure and research dynamics of the FMCG industry in India. Bibliometric analysis is a popular method for quantitatively evaluating published literature and discovering patterns in knowledge development (Aria & Cuccurullo, 2017; Donthu et al., 2021). Unlike traditional narrative reviews, bibliometric techniques identify the volume and impact of research, as well as intellectual connections, collaboration networks, and thematic growth in a given field. The bibliometric analysis consisted of two complementary parts.

2.1.1 Performance Analysis

The researcher evaluated the productivity and impact of the research output. This analysis examined metrics such as the yearly growth of publications, total citations, authors' h-index,

journal impact, and contributions from institutions. In this context, performance analysis highlights the most productive authors, leading institutions, and top journals in the SSCP research in the Indian FMCG sector.

2.1.2 Thematic (or Science Mapping) Analysis

The researcher focused on revealing the knowledge structure and growth in this field. Techniques such as keyword co-occurrence, co-authorship, and co-citation analyses are used to map research clusters, themes, and intellectual connections. This thematic analysis aims to identify key topics such as green packaging, circular economy, sustainable logistics, ESG reporting, and consumer-driven sustainability in FMCG supply chains, while tracking their evolution over time. By combining these two approaches, bibliometric analysis provides a complete view of the field, allowing the study to answer questions about not only who and where the research comes from but also what and how the key themes shape academic discussions.

2.2 Process of Data Collection

The methodology followed in this study was a structured process with four main stages.

2.2.1 Database Selection

The author selected SCOPUS as the best scholarly database for collecting data on the SSCP in India.

2.2.2 Search String

The author used the following search string in SCOPUS to create a CSV file for the analysis:

"sustainable supply chain" OR "green supply chain" OR "supply chain sustainability" OR "supply chain performance" OR "supply chain efficiency" OR "performance measurement"

AND

"fast moving consumer goods" OR FMCG OR "consumer goods industry" OR "packaged goods" OR "retail supply chain".

2.2.3 Data Extraction and Refinement

The author presents the export of bibliographic data, removes duplicates, and filters to ensure relevance to the Indian FMCG industry through a flowchart.

Figure 1: Selection criteria for bibliometric analysis

2.2.4 Bibliometric Techniques for Analysis

Application of performance indicators and thematic mapping tools to generate descriptive insights and visual representations of the knowledge base. This structured framework ensures rigor and replicability and provides a solid foundation for mapping research trends and intellectual development in sustainable supply chain performance specific to India's FMCG sector.

3. Results

The results of this bibliometric analysis present a clear overview of the intellectual landscape and research progress on the SSCP in the Indian FMCG sector. By examining publication trends, author productivity, journal impact, institutional contributions, collaboration patterns, and thematic structures, this section offers performance and thematic insights into how this field has evolved over the past two decades. The aim of presenting these results is twofold: first, to highlight the performance aspect of the literature, revealing “who” is contributing and “where” the contributions are concentrated; second, to explore the thematic aspect, uncovering “what” topics dominate the discourse and “how” these themes have developed over time. This dual approach ensures a balanced understanding of the quantitative growth in research and the qualitative direction in which scholarship is heading.

The performance analysis begins with an examination of annual publication and citation trends, offering insights into the growth of the research output over time. This analysis highlights the increasing interest in SSCP within India’s FMCG sector and reflects broader global trends in sustainability and supply chain management. Identifying prolific authors, leading institutions, and highly cited journals shows where intellectual leadership in this area exists, whereas country-level contributions reveal the extent of national and international collaboration in shaping the field. Together, these indicators provide a snapshot of the productivity and impact of the research.

3.1 Performance Analysis

3.1.1 Descriptive Statistics

The bibliometric dataset for this study covers the period from 1998 to 2025, capturing nearly three decades of research on the SSCP within the FMCG sector in India. During this period, 55 documents were identified across 46 journals. This relatively modest number of publications indicates that SSCP research has gained traction in India. Its application in the FMCG industry remains an emerging and steadily growing field. The annual growth rate of 7.47% shows a consistent rise in scholarly attention, suggesting increasing academic and industrial recognition of sustainability as a critical concern in FMCG supply chain sustainability.

The average document age is 5.96 years, highlighting that much of the literature is recent and aligns with the global increase in sustainability and ESG-related research after 2015. Moreover, the field has achieved a strong citation impact, with an average of 36.58 citations per document, reflecting the influence and visibility of the studies. The dataset references 495 cited sources, indicating a well-established knowledge base drawn from diverse fields, such as supply chain management, environmental management, and business sustainability.

In terms of document content, the analysis revealed 161 Keywords Plus and 359 Author Keywords, suggesting a broad thematic diversity. The high number of author-defined keywords indicates that researchers are approaching the SSCP from multiple angles, covering topics such as green logistics, packaging, circular economy, consumer behaviour, and ESG reporting. This

rich vocabulary reflects the interdisciplinary nature of sustainability research in FMCG supply chains.

The author profile shows a reasonably strong level of scholarly engagement, with 157 authors contributing to 55 papers. Interestingly, only five documents had a single author, suggesting that research in this area is primarily collaborative. On average, each document had three co-authors, reflecting a healthy trend of teamwork and contributions from multiple institutions. The international co-authorship rate of 25.45% highlights the global relevance of the topic, indicating that nearly one-quarter of the studies involve cross-country collaboration, possibly linking Indian researchers with counterparts in Europe, North America, and other Asian regions, where sustainable supply chain research is more advanced.

Finally, in terms of document type, the dataset consisted solely of articles (55 documents), with no books or reviews. This indicates that the literature is still in the process of establishing foundational empirical and conceptual contributions rather than consolidating knowledge through extensive reviews. The predominance of articles emphasises original research outputs, reinforcing the idea that SSCP in the Indian FMCG industry remains an evolving research stream with opportunities for future systematic reviews and meta-analyses.

Taken together, these descriptive indicators show that while research output in this area is modest in volume, it is steadily growing, highly collaborative, and influential in terms of the citation volume. The dataset reflects both the nascent stage and potential of SSCP research in India's FMCG sector, laying a solid foundation for identifying thematic clusters and intellectual structures in the following sections of this analysis.

Table 1: Descriptive Statistics -Main information about data

Description	Results
Timespan	1998:2025
Sources (Journals, Books, etc)	46
Documents	55
Annual Growth Rate %	7.47
Document Average Age	5.96
Average citations per doc	36.58
References	495
DOCUMENT CONTENTS	

Keywords Plus (ID)	161
Author's Keywords (DE)	359
AUTHORS	
Authors	157
Authors of single-authored docs	5
AUTHORS COLLABORATION	
Single-authored docs	5
Co-Authors per Doc	3
International co-authorships %	25.45
DOCUMENT TYPES	
A	55

3.1.2 Annual Scientific Production

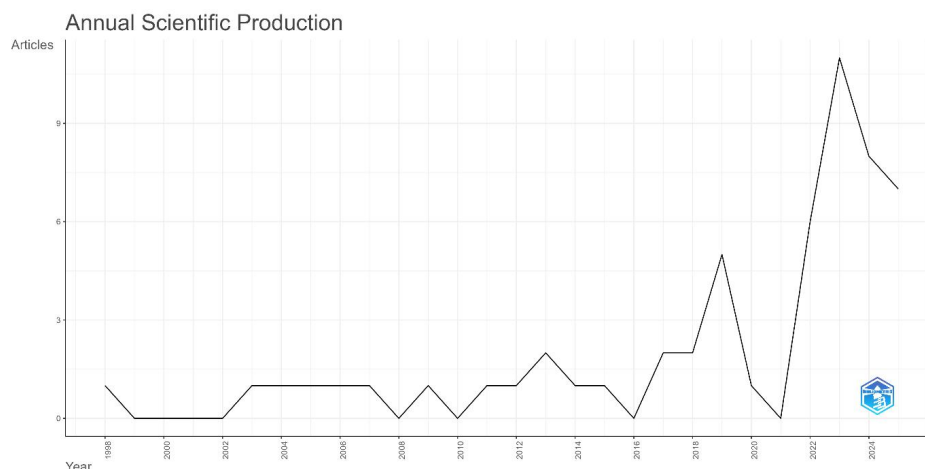
The trajectory of research output on SSCP in the Indian FMCG sector reveals three distinct phases of development. During the early stage (1998–2010), publications were scattered, with several years of no research activity. This period represents the early phase of sustainability research in FMCG supply chains, where attention was limited, and discussions were confined to broader debates on environmental management and supply chain efficiency. This inconsistency highlights the lack of focused scholarly efforts on FMCG-specific sustainability issues.

The growth phase (2011–2019) marked the beginning of steady academic engagement with the topic. Annual publications gradually increased, averaging one to two publications per year. Although the output remained modest, this period reflected a growing scholarly recognition of issues such as packaging waste, green logistics, and ethical sourcing in FMCG supply chains. The adoption of the United Nations Sustainable Development Goals (2015) provided additional momentum by placing a global focus on sustainable production and consumption, encouraging Indian researchers to explore these themes in more depth. This stage served as a formative period for building the foundation of the SSCP literature in India.

The rapid expansion phase from 2020 to 2025 marks a significant moment in this field's evolution. After 2020, there was a sharp increase in publications, peaking at 11 documents in 2022, the highest in the dataset. This surge is linked to several external factors: the introduction

of ESG and Business Responsibility and Sustainability Reporting (BRSR) frameworks by SEBI, a greater focus on sustainability by consumers and companies, and the COVID-19 pandemic, which highlighted supply chain resilience and environmental impact. Although the number of publications dipped slightly after 2022, the levels remained considerably higher than in the previous decades, showing that sustainable supply chain performance (SSCP) in fast-moving consumer goods (FMCG) has developed into a well-established research area.

The annual growth rate of 7.47% indicates steady, long-term growth in scholarly attention. Recent research is relatively new, with an average age of 5.96 years, suggesting that this field is still emerging. The increase in publications over the past five years shows that sustainable supply chain performance in India's FMCG sector has moved from being underexplored to becoming a significant area of academic and managerial interest. The presence of 25.45% international collaborations indicates that Indian research is becoming more connected to global academic networks, improving its quality and visibility. Overall, these trends reflect the field's journey from fragmented beginnings to a rapidly maturing and impactful body of knowledge, paving the way for more thematic and policy-oriented exploration in the future.



Image

Figure 1: Annual Production of Articles

3.1.3 Author Impact and Contribution

The bibliometric analysis outlined in Table 4.2 points out several key authors who have influenced the discussion on SSCP in the Indian FMCG sector, each contributing at different levels of frequency, citations and impact over time.

Among the earlier contributors, Acharya and Padmanav, along with Singh and Kumar (2019), achieved notable recognition with single publications that attracted 68 citations each, averaging 9.71 citations per year. Although their contribution frequency is modest, the high citation rate

highlights the influence and visibility of their work in establishing important foundations for SSCP research. Their work serves as a reference for future studies, especially those focused on performance measurement and sustainability frameworks within supply chains.

A significant shift is evident in the more recent contributions of Prajapati, Dharendra, and Pratap, Saurabh (2022), who together produced two publications that have had a strong impact, with 56 citations in a short time. Their annual citation rate of 14 per year shows that their research resonates with current discussions, particularly in areas such as green efficiency, FMCG packaging innovation, and sustainability metrics.

The emergence of Prashar and Anupama adds depth to the field, with contributions spanning 2023 to 2025. Her 2023 publication has already received 15 citations, averaging five citations per year, whereas her 2025 article, although recent, has started to attract attention with five citations in its first year. This consistency suggests a growing academic presence and positions her as a rising voice in sustainability and supply chain research in the FMCG sector in India.

New contributors, including Abdu, B. (2024) and Abhyankar, Gayatri Jayant (2025), have early works that are still being shared, with limited citations at this stage. Their involvement indicates a growing author base and increasing appeal of SSCP in FMCG as a research topic. Similarly, Rana, Prashant Singh, and Sharma, Anupam, both publishing in 2025 with two contributions each, signal the entry of new scholars into the discussion. Although their work has not yet been cited, their output frequency shows a commitment to advancing the field, suggesting that their influence may increase as their research gains attention.

Table 2: Authors Production

Author	Y	F	TC	TCpY
ACHARYA, PADMANAV	2019	1	68	9.714
SINGH, ROHIT KUMAR	2019	1	68	9.714
PRAJAPATI, DHIRENDRA	2022	2	56	14
PRATAP, SAURABH	2022	2	56	14
PRASHAR, ANUPAMA	2023	1	15	5
ABDU, B.	2024	1	1	0.5
PRASHAR, ANUPAMA	2025	1	5	5
ABHYANKAR, GAYATRI JAYANT	2025	1		

RANA, PRASHANT SINGH	2025	2		
SHARMA, ANUPAM	2025	2		

Overall, the author analysis demonstrates a clear generational shift: earlier impactful works provided conceptual foundations, mid-phase authors like Prajapati and Pratap achieved rapid influence, and newer entrants such as Prashar, Rana, and Sharma are currently advancing the field. This mix of established, emerging, and new authors indicates that the SSCP in the Indian FMCG sector has become a diverse and dynamic area of study, with contributions spanning multiple generations of scholars.

3.1.4 Most Influential Papers

Citation analysis shows that research on SSCP in the FMCG sector has been shaped by both recent high-impact studies and earlier foundational works, as presented in Table 3. The most notable example is the paper by M (2022) in *Sustainable Operations and Computers*, which is the most influential in the dataset with 627 citations and an average of 156.75 citations per year. Its rapid citation growth suggests that it has caught the attention of scholars worldwide, likely because it incorporates current themes such as digital technologies, sustainability metrics, and performance measurement frameworks.

The second most influential study is A (2006) in the *European Journal of Operational Research*, with 592 citations, at an annual average of 29.60. Although published earlier than M (2022), this paper has sustained a long-term scholarly influence, reflecting its importance as a conceptual or methodological foundation in operational and supply chain sustainability research. Its relevance for nearly two decades highlights its position as a standard in the field.

Similarly, SK (2004) in *Vikalpa* has made a notable contribution, with 301 citations, averaging 13.68 citations annually. Its presence in the top-cited list underscores the early involvement of Indian scholars in sustainability and supply chain management before it gained mainstream research attention.

Among more recent contributions, RK (2019) in the *Global Journal of Flexible Systems Management* achieved 68 citations, averaging 9.71 per year, which shows strong and steady recognition. The paper by S (2023) in *Management Decision* has already received 49 citations, averaging 16.33 per year, marking it as an emerging work with a significant potential to influence future research.

Another impactful study is D (2022) in the *International Journal of Production Economics*, with 49 citations but a slightly lower annual impact of 12.25 citations per year. Both S (2023) and D (2022) represent the new wave of scholarship linking supply chain performance with ESG frameworks, circular economy, and digital transformation in FMCG supply chains.

Foundational yet persistent contributions appear in D (2015) in Production Planning & Control, which holds 44 citations (4.00 per year), and RK (1998) in the International Journal of Quality & Reliability Management, which, despite its age, has 25 citations, indicating its historical importance as one of the earliest studies connecting quality, reliability, and sustainability. Likewise, LL (2009) in Computers & Industrial Engineering recorded 23 citations (1.35 per year), adding methodological rigor to sustainability and operational efficiency studies.

Finally, the paper by S (2023) in the Journal of Global Operations and Strategic Sourcing, accumulating 21 citations at 7.00 per year, shows how recent publications in global sourcing and sustainable operations have quickly gained traction. Its inclusion in the top-cited list, despite being recent, reflects the increasing academic interest in sustainability research within globalised FMCG supply chains. Collectively, these citation patterns paint a balanced intellectual landscape: earlier works from 1998 to 2010 provided foundational concepts and methods, while recent publications from 2022 to 2023 drive modern discussions with accelerated citation rates. This mixture of foundational and emerging research highlights both the maturity and vibrancy of SSCP scholarship, indicating that the field is building on established theories while eagerly exploring new directions driven by technology, ESG mandates, and global sustainability challenges.

Table 3: Most Global Cited Papers

Paper	Total Citations	TC per Year
M, 2022, SUSTAIN. OPER. COMPUT.	627	156.75
A, 2006, EUR. J. OPER. RES.	592	29.6
SK, 2004, VIKALPA	301	13.68
RK, 2019, GLOB. J. FLEX. SYST. MANAG.	68	9.71
S, 2023, MANAG. DECIS.	49	16.33
D, 2022, INT. J. PROD. ECON.	49	12.25
D, 2015, PROD. PLAN. CONTROL.	44	4
RK, 1998, INT. J. QUAL. RELIAB. MANAG.	25	0.89
LL, 2009, COMPUT. IND. ENG.	23	1.35
S, 2023, J. GLOB. OPER. STRATEG. SOURC.	21	7

3.1.5 Affiliation Contributions

The bibliometric analysis of affiliations presented in Table 4 shows that research on SSCP in the Indian FMCG sector is propelled by a mix of leading business schools, universities, and specialised management institutes. The most prolific contributor was the Symbiosis Centre for Management and Human Resource Development (SCMHRD), which led with nine papers. This dominance highlights the institution's strong research emphasis on sustainability, supply chain efficiency and management practices. Its output reinforces Symbiosis' role as a knowledge centre for contemporary supply chain sustainability issues in India.

Following SCMHRD is the Management Development Institute (MDI), with five publications, further establishing its status as one of India's top management schools with a robust contribution to sustainability and operations management literature. The involvement of Chaoyang University of Technology (Taiwan) with four publications adds an international aspect to this research field, suggesting that Indian FMCG-focused studies are attracting global collaboration and interest, especially from Asian institutions.

Among Indian institutions, the Indian Institute of Management (IIM) Mumbai and Sharda University each contributed four articles, showing the increasing engagement of both well-established IIMs and emerging private universities in advancing sustainability research in the FMCG sector. The contributions from IIM Mumbai reflect the institute's alignment with the national sustainability agenda and corporate ESG frameworks.

The next tier of contributors includes Amity University Rajasthan, FORE School of Management, Great Lakes Institute of Management, and ICAI University, each with three publications each. These institutions, although smaller in volume than SCMHRD, contribute to the academic richness of SSCP research in India by offering diverse regional perspectives and methodologies. Similarly, the Indian Institute of Management Indore (IIM Indore), with three articles, underscores the consistent role of IIMs in shaping the discourse on supply chains.

Overall, the distribution of publications among these institutions shows that SSCP in the FMCG sector is not dominated by a single academic centre but reflects a collective effort by multiple institutions. Established management schools like SCMHRD, MDI, and IIMs lead research output, while private universities and newer business schools actively add to the growing knowledge base. This trend illustrates both the academic diversity in Indian management education and the rising acknowledgement of the critical importance of sustainability in FMCG supply chains across various institutions.

The rapid growth phase from 2020 to 2025 represents a crucial period in the development of this field. After 2020, there was a sharp rise in publications, peaking at 11 in 2022, the highest number in the dataset. This increase is tied to several factors: the launch of ESG and Business Responsibility and Sustainability Reporting (BRSR) frameworks by SEBI, increased attention to sustainability from consumers and companies, and the COVID-19 pandemic, which emphasised supply chain resilience and environmental impact. Although the number of publications

decreased slightly after 2022, the levels remained much higher than those in previous decades. This indicates that research on SSCP in FMCG is a well-established area of study.

Table 4: Most Relevant Affiliation

Affiliation	Articles
SYMBIOSIS CENTRE FOR MANAGEMENT AND HUMAN RESOURCE DEVELOPMENT	9
MANAGEMENT DEVELOPMENT INSTITUTE	5
CHAOYANG UNIVERSITY OF TECHNOLOGY	4
INDIAN INSTITUTE OF MANAGEMENT MUMBAI	4
SHARDA UNIVERSITY	4
AMITY UNIVERSITY RAJASTHAN	3
FORE SCHOOL OF MANAGEMENT	3
GREAT LAKES INSTITUTE OF MANAGEMENT	3
ICFAI UNIVERSITY	3
INDIAN INSTITUTE OF MANAGEMENT INDORE	3

The annual growth rate of 7.47% shows consistent, long-term growth in scholarly interest. Recent research tends to be relatively new, averaging 5.96 years, suggesting that this field is still vibrant and active. The increase in publications over the past five years shows that sustainable supply chain performance in India's FMCG sector has shifted from being underexplored to becoming a significant area of academic and managerial interest. The figure of 25.45% international collaborations indicates that Indian research is becoming more interconnected with global academic networks, enhancing its quality and its visibility. Overall, these trends reflect the field's transition from scattered beginnings to a rapidly maturing and impactful body of knowledge, paving the way for more focused and policy-driven exploration in the future to come.

3.1.6 Source Contributions

The analysis of publication sources presented in Table 5 highlights the variety of journals and outlets contributing to the discourse on SSCP in the Indian FMCG industry. Emerald Emerging Markets Case Studies and the Journal of Global Operations and Strategic Sourcing emerged as the most active sources, each publishing three articles. Their prominence reflects a dual focus:

the former emphasises practical, case-based applications of sustainability strategies in emerging economies, whereas the latter addresses global supply chain management issues, making both highly relevant to India's FMCG sector.

Several leading management and operations journals have played key roles in sharing SSCP research. Benchmarking, the Indian Journal of Marketing, the International Journal of Productivity and Performance Management, Management Decision, and Vikalpa each contributed two publications. These journals represent a mix of international and national publications in the field. Benchmarking and Management Decision provide a global platform for methodological rigor and strategic implications, while Vikalpa and the Indian Journal of Marketing show the role of Indian journals in contextualising sustainability discussions for local industry and market dynamics. Together, these journals connect global theoretical developments with India-specific insights.

In addition to these core outlets, the dataset includes single contributions from various journals, indicating the interdisciplinary nature of SSCP research. Journals such as Accounting and the Australasian Accounting, Business and Finance Journal reflect financial and reporting perspectives on sustainability, while Big Data and Cognitive Computing introduce a technological dimension, highlighting the growing relevance of digital tools and analytics in measuring and improving sustainability in supply chains. These single-article contributions show that SSCP is not limited to traditional operations management outlets but is expanding into related fields such as finance, technology, and interdisciplinary business studies.

Overall, the source analysis suggests that SSCP research in India's FMCG sector is rooted in a mix of case study-driven emerging market outlets, operations-focused journals and cross-disciplinary platforms. The balanced distribution of contributions across international and national journals illustrates the field's maturity, while the variety of outlets highlights the wide applicability and relevance of sustainability in FMCG supply chains for companies.

Table 5: Most Relevant Sources

Sources	Articles
EMERALD EMERGING MARKETS CASE STUDIES	3
JOURNAL OF GLOBAL OPERATIONS AND STRATEGIC SOURCING	3
BENCHMARKING	2
INDIAN JOURNAL OF MARKETING	2
INTERNATIONAL JOURNAL OF PRODUCTIVITY AND PERFORMANCE MANAGEMENT	2

MANAGEMENT DECISION	2
VIKALPA	2
ACCOUNTING	1
AUSTRALASIAN ACCOUNTING, BUSINESS AND FINANCE JOURNAL	1
BIG DATA AND COGNITIVE COMPUTING	1

32 Thematic Analysis

The keyword co-occurrence map in Figure 2 depicts the intellectual and thematic structure of the research on the SSCP in the Indian FMCG sector. Distinct clusters emerged, each showcasing a specific research stream and its connection to broader debates on sustainability and supply chain management.

1. Supply Chain Management (Orange Cluster)

At the heart of the network lies supply chain management, which serves as the hub around which other themes revolve. Closely linked terms such as inventory, bullwhip effect, and sales indicate that researchers have focused on traditional efficiency and performance issues within supply chains while gradually incorporating sustainability into their research. This cluster reflects fundamental concerns regarding operational effectiveness, decision making, and performance evaluation.

2. Sustainability and Circular Practices (Green Cluster)

A strong cluster around sustainability, reverse logistics, recycling, logistics, and Industry 4.0 highlights the growing incorporation of environmental management into supply chain conversations. The focus on reverse logistics and recycling suggests that waste reduction and circular economy practices are key themes in FMCG research because of the sector's reliance on packaging waste. The connection to Industry 4.0 indicates a shift toward technology-driven sustainability, where automation, data analytics, and smart systems enhance green practice.

3. Technology and Analytics in Supply Chains (Blue Cluster)

Another significant cluster revolved around artificial intelligence, machine learning, profitability, and risk. This theme demonstrates how digital transformation is utilised to assess and enhance sustainable supply chain performance. The link between AI and machine learning with profitability and risk reflects a dual focus—leveraging technology not only for sustainability but also for financial performance and risk management in FMCG supply chains.

4. Corporate Responsibility and Decision-Making (Red Cluster)

The keywords supply chain, corporate social responsibility (CSR), decision-making, and business development form a different stream, emphasising the strategic and governance-related aspects of sustainability. This cluster reflects research connecting sustainability to broader

corporate responsibility agendas, where companies integrate ethical sourcing, CSR, and responsible decision making into supply chain practices. This highlights a shift from purely operational efficiency to strategic alignment with sustainability.

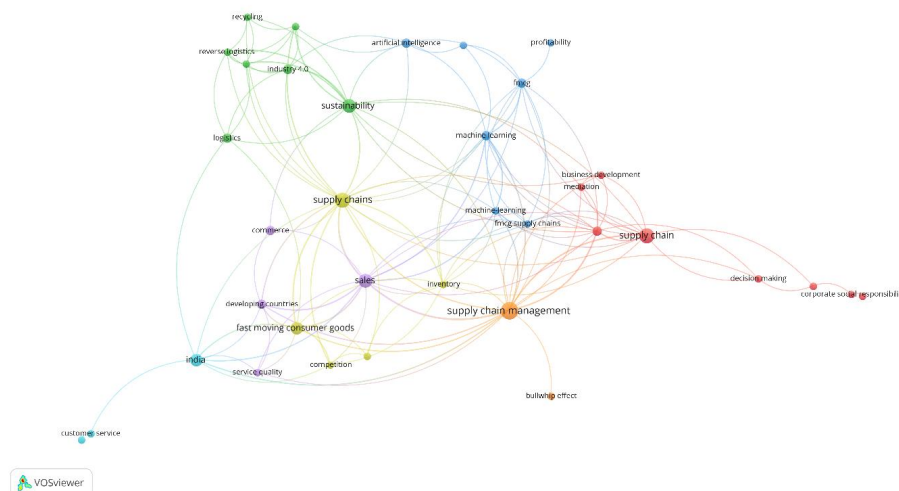
5. India and Emerging Market Focus (Teal Cluster)

A unique thematic area connects India, fast-moving consumer goods, developing countries, commerce, competition and service quality. This cluster is particularly relevant because it situates research in an emerging market context. It highlights how sustainability challenges in FMCG supply chains are shaped by India's distinct traits: rapid urbanisation, diverse consumer preferences, infrastructure gaps, and intensifying competition. The link between customer service and service quality suggests that consumer-facing sustainability (such as eco-packaging and ethical branding) is an area of increasing interest.

6. Sales, Competition, and Market Dynamics (Purple Cluster)

The presence of sales, competition, and developing countries as interconnected themes reveals that sustainability in FMCG supply chains is studied within the competitive and market contexts of emerging economies. This theme emphasises the balance that companies must maintain between sustainable practices and competitiveness in price-sensitive market.

Keyword analysis revealed a multifaceted research environment. At its core, SSCP research combines traditional efficiency concerns with emerging sustainability concerns. On the one hand, themes of inventory management and sales focus on performance measurement; on the other, reverse logistics, recycling, and CSR represent sustainability integration. The increasing importance of AI, machine learning, and Industry 4.0 indicates the next frontier of research: technology-enabled sustainability in FMCG supply chains. Meanwhile, the unique clustering of India and developing countries underlines the contextual grounding of this research in emerging markets, emphasising both consumer-facing sustainability and the challenges of balancing growth and responsibility. Some themes are presented in Table 6.



Image

Figure 2: Keyword Analysis

Table 6: Identification of Research Focus as per Themes

Cluster	Key Keywords	Theme Identified	Research Focus
Orange (Central)	Supply chain management, supply chains, inventory, bullwhip effect, sales	Core Supply Chain Efficiency & Performance	Traditional concerns with operational effectiveness, inventory
Green	Sustainability, reverse logistics, recycling, logistics, industry 4.0	Sustainability & Circular Practices	Emphasis on environmental management, waste reduction, and
Blue	Artificial intelligence, machine learning, profitability, risk	Technology & Analytics for Sustainable Supply Chains	Focus on AI and machine learning applications
Red	Supply chain, corporate social responsibility, decision-making, business development	Corporate Responsibility & Strategic Sustainability	Linking SSCP with CSR, ethical sourcing, and decision-making frameworks that position sustainability as a business strategy
Teal (India-focused)	India, fast-moving consumer goods, developing countries,	Emerging Market & Consumer-	Contextualising
Purple	Sales, competition, developing countries	Market Dynamics & Competitiveness	Balancing sustainability initiatives with market-driven imperatives such as sales growth, pricing pressures, and competition in FMCG.

3.4 Identification of Research Gap

The identification of research gaps highlighted in Table 7 shows that SSCP in the Indian FMCG industry has emerged as a distinct research area. However, its knowledge base remains

fragmented and unevenly developed across different themes. The current literature covers operational, environmental, technological, strategic, and consumer-centred aspects but lacks depth in terms of integration, empirical validation, and contextual adaptability.

First, research on core supply chain efficiency and performance continues to focus on traditional inventory management, the bullwhip effect, and cost-optimisation models (Nweje & Taiwo, 2025). Although these models remain useful, they have not been fully extended to address both efficiency and sustainability. This gap suggests the need for hybrid performance frameworks that incorporate both traditional operational metrics and sustainability indicators, such as carbon footprint reduction, packaging efficiency, and energy usage.

Second, the sustainability and circular practices cluster shows that much attention has been given to recycling and reverse logistics (Lai et al., 2022); however, there is limited research on comprehensive circular economy frameworks specific to FMCG supply chains. For example, the unique challenges of plastic packaging in FMCG and consumer participation in recycling remain unexamined. This presents opportunities for research on consumer willingness to adopt eco-packaging, policy incentives for waste recovery, and innovative closed-loop FMCG supply chain models.

Third, the increasing role of technology and analytics in supply chain management is evident in the literature, with artificial intelligence and machine learning recognised as important tools. However, existing studies tend to conceptualise rather than empirically validate these technologies in the context of sustainability. There is a lack of evidence on how digital tools translate into measurable environmental outcomes (Meinhold et al., 2024). Therefore, future research should focus on applied studies using AI to track carbon emissions, reduce waste, establish blockchain-based traceability, and develop digital twin models to evaluate sustainability in FMCG operations.

Fourth, research linking corporate responsibility and sustainability strategies remains mainly centred on reporting mechanisms and CSR disclosure (Shakur et al., 2024). While these are important, there has been limited examination of how CSR frameworks are implemented in supply chains. This offers an opportunity to explore how CSR-driven sustainable supply chains impact consumer trust, brand image, and long-term competitive advantage, particularly in a sector such as FMCG, where consumer perception is sensitive to brand responsibility.

Fifth, while studies specific to India highlight the relevance of emerging markets and consumer-centric sustainability, much of the existing research focuses on urban areas, overlooking the complexities of rural supply chains, where affordability, distribution infrastructure, and low consumer awareness present significant challenges. The underrepresentation of rural and low-income consumer contexts is a critical research gap (Olutimehin et al., 2024). Future studies must examine inclusive models of sustainable FMCG supply chains that balance eco-friendliness with affordability and access, ensuring that sustainability does not become an urban privilege.

Finally, the market dynamics and competitiveness cluster underscores the practical tension between sustainability and profitability in the FMCG markets (Abatan et al., 2024). Current research often frames sustainability as an additional benefit rather than an integrated business strategy. This overlooks critical questions, such as whether sustainable practices enhance or hinder competitiveness in price-sensitive fast-moving consumer goods (FMCG) markets. What trade-offs do firms face when adopting sustainability on a large scale? Longitudinal and consumer behaviour studies can provide insights into how sustainability initiatives impact market competitiveness and purchasing behaviour over time.

In summary, while research on SSCP in FMCG has grown in various areas, the field now requires better integration, more contextual awareness, and stronger evidence. Future studies should focus on linking operational efficiency with sustainability results, using digital technologies for measurable impacts, incorporating CSR into supply chain strategies, and addressing unique challenges in rural and price-sensitive markets. By addressing these issues, researchers and practitioners can develop a more actionable framework for promoting sustainable FMCG supply chains in India and other emerging economies.

Table 7: Future Research Scope

Theme / Cluster	Current Focus in Literature	Identified Research Gaps	Future Research Directions
Supply Chain Efficiency & Performance	It focuses	Limited integration of sustainability measures into traditional performance models.	Develop hybrid frameworks combining efficiency and sustainability KPIs; empirical studies on trade-offs between cost, speed and environmental impact.
Sustainability & Circular Practices	Studies on reverse logistics, recycling, and	Lack of sector-specific models for the circular economy in FMCG; limited research on consumer participation in recycling and eco-packaging adoption.	Future research should explore
Technology & Analytics	The use	Limited empirical studies	The
Corporate Responsibility & Strategic	Linking CSR, decision-making, and business	CSR	Investigate how CSR-driven supply chains affect consumer trust, brand

Sustainability	development with supply chains.		strength, and long-term financial sustainability in FMCG
Emerging Market & Consumer-Centric Sustainability	India-specific studies on FMCG, service quality, and developing countries	Limited focus on rural supply chains and affordability constraints; under-representation of low-income	Study sustainability challenges in rural FMCG supply chains; design inclusive models balancing affordability and eco-friendliness;
Market Dynamics & Competitiveness	Balancing sales, competition, and sustainability initiatives.	Lack of research on	Conduct longitudinal studies on how sustainability affects competitiveness

4. Conclusion

This bibliometric study provides an overview of the SSCP research in the Indian FMCG sector, highlighting its growth, themes, and structure. The findings show that while the field has matured since its early, scattered contributions in the late 1990s, it has gained significant traction only recently, especially after 2020. The rise in research output, along with the high citation rates of recent works, highlights the increasing importance of sustainability in FMCG supply chains amid global ESG pressures, regulations such as SEBI's BRSR mandate, and consumer-driven sustainability demands.

The analysis of authors, institutions, and sources shows a diverse and collaborative research base, with key contributions from top Indian management institutes and international partnerships. Thematic mapping identified six major clusters—efficiency and performance, circular practices, technology and analytics, corporate responsibility, consumer-focused sustainability, and market competitiveness—each representing different but interrelated aspects of SSCP research. These clusters capture the complex nature of sustainability in FMCG supply chains, covering operational, technological, strategic, and socioeconomic perspectives.

However, this study also identified significant research gaps that create opportunities for future studies. Although traditional supply chain models are still prominent, they must integrate sustainability metrics to reflect the goals of efficiency and sustainability. Similarly, areas such as consumer involvement in circular practices, rural supply chain sustainability, and the use of digital technologies remain underexplored. There is also a crucial need to investigate the conflict between sustainability and market competitiveness in price-sensitive FMCG sector. Addressing these gaps can enrich academic discussions and offer practical insights for policymakers and industry leaders pursuing sustainable consumption and production in India.

In conclusion, this study maps the intellectual landscape of SSCP research in India's FMCG sector by identifying influential authors, institutions, and themes, while also suggesting future research paths. As the FMCG sector continues to play a vital role in India's economy and consumer culture, embedding sustainability into its supply chains is essential. Bridging the recognised research gaps through interdisciplinary approaches, real-world validation, and contextual sensitivity can result in supply chains that are efficient, competitive, and aligned with long-term environmental and social objectives. This directly supports India's commitment to sustainable development and provides valuable insights into other emerging economies facing similar challenges.

4.1 Practical Implications

The findings of this bibliometric study extend beyond academia and provide useful insights for FMCG companies, policymakers, and consumers, who are key to advancing the SSCP in India.

4.1.1 FMCG Companies

The results emphasise the growing global and national focus on integrating sustainability into supply chains. Companies must move beyond viewing sustainability as mere compliance and incorporate it into their core business strategies. This involves investing in green packaging, reverse logistics, and digital tools like AI, blockchain, and the Internet of Things for better transparency and efficiency. By aligning their practices with ESG frameworks and consumer expectations, FMCG firms can enhance their brand strength, boost their competitiveness, and ensure long-term resilience.

4.1.2 Implications For Policymakers and Regulators

The study highlights the increased academic attention to sustainability challenges in FMCG supply chains, but it also points out areas that need more exploration, such as rural logistics and consumer affordability. Policymakers should create targeted policies and incentives to support circular economies, eco-innovation, and sustainable distribution in underserved markets. Strengthening regulations, such as the Business Responsibility and Sustainability Reporting (BRSR), and offering subsidies for green technologies will encourage sustainability efforts across the sector.

4.1.3 For Consumers and Society

The consumer aspect of sustainability, especially service quality and eco-friendly product choices, is a recurring theme in the literature. Informing consumers about the environmental effects of FMCG choices and encouraging them to engage in recycling and green purchasing can significantly shape sustainable demand. As consumer expectations change, collective action by civil society encourages companies to adopt more responsible practices.

4.1.4 For Academia and Future Research

The thematic clusters reveal research gaps in rural supply chain sustainability, the real-world validation of digital technologies, and the cost-benefit trade-offs of green practices. Academic researchers can address these gaps by using interdisciplinary methods that connect sustainability

with marketing, technology, and social policies. This will deepen theoretical understanding and provide practical knowledge for practitioners.

In summary, achieving sustainable FMCG supply chains in India requires a concerted effort. Companies must innovate and incorporate sustainability into their daily operations, policymakers should create supportive environments with incentives and regulations, and consumers must actively participate in responsible consumption practices. Together, these efforts can help India's FMCG sector balance growth with ecological responsibility, contributing to the national vision of sustainable development and inclusive growth.

References

1. Abatan, A., Jacks, B., Lottu, O., Ugwuanyi, E., Obaigbena, A., Daraojimba, A., & Sodiya, E. (2024). Sustainable packaging innovations and their impact on HSE practices in the FMCG industry. *Magna Scientia Advanced Research and Reviews*, 10(1), 379–391. <https://doi.org/10.30574/msarr.2024.10.1.0029>
2. Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975.
3. Carter, C. R., & Easton, P. L. (2011). Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, 41(1), 46–62.
4. Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward a new theory. *International Journal of Physical Distribution & Logistics Management*, 38(5), 360–387.
5. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296.
6. Dubey, R., Gunasekaran, A., & Papadopoulos, T. (2017). Green supply chain management: Theoretical framework and further research directions. *Benchmarking: An International Journal*, 24(1), 184–218.
7. Gupta, H., & Singh, S. (2020). Green supply chain management and sustainability of organisations: A bibliometric analysis. *Benchmarking: An International Journal*, 27(8), 2415–2437.
8. Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. *International Strategic Management Review*, 3(1–2), 128–143.
9. Kumar, S., Teichman, S., & Timpernagel, T. (2020). Green supply chain management: A case study of Indian FMCG sector. *Journal of Cleaner Production*, 276, 124–132.
10. Lai, N. Y. G., Kim, C. H., Kuah, A. T. H., & Wong, K. H. (2022). Toward sustainable express deliveries for online shopping: Reusing packaging materials through reverse logistics. *Thunderbird International Business Review*, 64(4), 351–362. <https://doi.org/10.1002/tie.22259>
11. Meinhold, R., Dhar, B. K., & Wagner, C. (2024). Digital sustainability and eco-environmental sustainability: A review of emerging technologies, resource challenges, and policy implications. *Sustainable Development*, 33(2), 2323–2338. <https://doi.org/10.1002/sd.3240>

12. Nweje, U., & Taiwo, M. (2025). Leveraging artificial intelligence for predictive supply chain management: Focus on how AI-driven tools are revolutionizing demand forecasting and inventory optimization. *International Journal of Science and Research Archive*, 14(1), 230–250. <https://doi.org/10.30574/ijrsra.2025.14.1.0027>
13. Olutimehin, D., Nwankwo, E., Ofodile, O., Ugochukwu, C., & Joel, O. (2024). Optimizing FMCG supply chain dynamics: A novel framework for integrating operational efficiency and customer satisfaction. *International Journal of Management & Entrepreneurship Research*, 6(3), 770–779. <https://doi.org/10.51594/ijmer.v6i3.934>
14. Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699–1710.
15. Shakur, M. S., Rahman, M. A., Bari, A. B. M. M., Lubaba, M., & Debnath, B. (2024). Exploring the challenges of Industry 4.0 adoption in the FMCG sector: Implications for resilient supply chains in emerging economies. *Logistics*, 8(1), 27. <https://doi.org/10.3390/logistics8010027>
16. Singh, R. K., Gunasekaran, A., & Kumar, P. (2021). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Research*, 59(12), 3708–3736.
17. Securities and Exchange Board of India (SEBI). (2023). *Business Responsibility and Sustainability Reporting (BRSR) Framework*. SEBI Circular, India.
18. United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. New York: United Nations.
19. Vuong, T. K., Bui, H. M., & Lam, T. N. (2024). Sustainable consumer behaviour in the fast-moving consumer goods sector: Moderating role of competitive intensity in green marketing. *Business Strategy & Development*, 7(4). <https://doi.org/10.1002/bsd2.70047>