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# Barriers to Circular Supply Chain Implementation in Indian Textile SMEs: An Exploratory Qualitative Study

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## ABSTRACT

The textile and apparel sector is a cornerstone of India's industrial growth, employing millions and contributing significantly to exports and GDP. However, it is also resource-intensive and polluting, largely due to linear "take-make-dispose" supply chains. As environmental concerns grow, circular supply chains (CSC) have emerged to reduce waste, optimise resources, and close material loops especially crucial in textiles, given high material turnover, waste, and chemical use. Despite global momentum, research on how Indian SMEs engage with CSCs remains limited.

This study explores barriers to CSC implementation in Indian textile SMEs using an exploratory qualitative approach. Semi-structured interviews with supply chain and operations managers across 23 SMEs revealed multiple interrelated barriers: low awareness of circular principles, limited access to green technologies and financing, inadequate infrastructure, weak regulatory enforcement, and internal resistance due to perceived risks and uncertain returns. Findings highlight the need for integrated support through policy innovation, ecosystem partnerships, and capacity-building initiatives tailored to SMEs. This study contributes empirical evidence on CSC adoption in Indian SMEs and provides a foundation for policy and comparative research across manufacturing sectors.

**Keywords:** Small and Medium Enterprises (SMEs), Supply Chain Transformation, Organisational Readiness, Circular Supply Chains, Emerging markets.

## INTRODUCTION

he textile and apparel sector is globally recognised for its socio-economic contributions as well as its significant environmental footprint. Responsible for vast consumption of water, energy, and chemicals, the industry is also one of the largest producers of industrial waste. Its prevailing linear model—characterised by the extract-produce-consume-discard cycle—has accelerated resource depletion and environmental degradation. In response to mounting environmental concerns and stakeholder pressure, the concept of a circular economy has gained traction, with Circular Supply Chains (CSC) emerging as a strategic pathway to decouple economic growth from resource consumption. Unlike traditional models, CSCs promote product longevity, material recovery, closed-loop logistics, and systemic waste reduction, thereby aligning supply chain operations with sustainability objectives.

In the global race toward circularity, the textile industry has become a focal point due to its highly fragmented value chain, short product life cycles, and post-consumption waste challenges. Several international brands and developed economies have begun embedding circular principles into design, sourcing, and logistics. However, in emerging markets like India—one of the world's largest textile-producing countries circular integration remains in its infancy.

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Despite India's textile sector being a key economic engine, contributing around 2% to GDP and employing over 45 million people, its value chain is predominantly driven by small and medium-sized enterprises (SMEs)..

The structural characteristics of Indian textile SMEs such as informal practices, limited financial capacity, outdated technology, and dependence on traditional supply chain models pose unique challenges to sustainability transformation. While large textile corporations may access the capital, infrastructure, and global knowledge required for circular transitions, SMEs often face significant institutional and operational barriers. These include a lack of awareness about circularity, limited access to green financing, supply-side inflexibility, and the absence of regulatory incentives. Moreover, research on CSCs within SMEs especially in the Global South is sparse, with existing literature largely concentrated in developed economies or focused on multinational enterprises. The absence of sector-specific, empirical research on barriers to CSC adoption within Indian textile SMEs presents a critical knowledge gap.

This study aims to address by conducting an exploratory qualitative investigation into the barriers that prevent Indian textile SMEs from adopting circular supply chain practices. The research seeks to identify and analyse the operational, organisational, and ecosystem-level constraints through the lived experiences and managerial insights of SME leaders in the textile and apparel sector. By focusing on a sector that is simultaneously environmentally intensive and economically vital, this study contributes both practical and theoretical value offering grounded insights for policymakers, practitioners, and sustainability scholars interested in advancing circularity in emerging economies.

## LITERATURE REVIEW

*Circular Economy and Supply Chains*

The circular economy (CE) is increasingly recognised as a transformative framework for sustainability, aiming to minimise resource use, extend product lifecycles, and reduce environmental impact [1]. In supply chain management, circular supply chains (CSC) operationalise these principles by incorporating reuse, remanufacturing, recycling, and reverse logistics into traditional processes. This approach not only conserves resources but also fosters innovation, cost efficiency, and regulatory compliance. For example, firms in Europe and North America have integrated closed-loop systems where post-consumer products are collected, refurbished, and reintroduced into production, creating economic and environmental value simultaneously [5].

Circular supply chains can be classified as closed-loop systems, which recycle products back into the same chain, or open-loop systems, where materials are redirected to alternative industries or markets [3]. While the theory of CSC is well-developed, practical implementation varies widely across sectors and regions. High-income countries have piloted advanced CSC initiatives using Industry 4.0 technologies such as IoT-enabled tracking, AI-based material sorting, and predictive analytics to optimise recycling streams [13]. However, these technologies require significant capital investment and skilled labour, often making CSC implementation more challenging for SMEs, especially in developing countries [1]

*Circularity in the Textile Sector*

Textile and apparel industries are notorious for their environmental intensity: they account for approximately 20% of global industrial water pollution and generate millions of tons of post-consumer textile waste annually [5]. Circularity initiatives in textiles primarily focus on three areas: eco-design, waste valorisation, and reverse logistics. Eco-design involves selecting materials and designing products to extend life and facilitate recycling. Waste valorisation converts textile scraps or worn-out garments into new products or energy, reducing landfill pressure. Reverse logistics manages the return, collection, sorting, and processing of used garments into productive channels [5], [6].

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Globally, leading apparel brands such as H&M, Zara, and Patagonia have pioneered take-back programs, rental models, and closed-loop production lines. These initiatives have demonstrated that integrating circularity can reduce raw material costs, improve brand value, and comply with emerging sustainability regulations. In India, the scenario is more fragmented. Large corporations and organised retail chains have begun experimenting with circular models, but SMEs—which form over 90% of the sector—still predominantly operate within linear supply chains [2], [3]. The gap between global best practices and local SME capabilities underscores the need for empirical research into the specific challenges and barriers Indian textile SMEs face in adopting circular practices

*Role of SMEs in Sustainable Supply Chains*

SMEs play a critical role in economic development, employment generation, and regional industrial clusters. In India, textile SMEs account for the majority of manufacturing units, particularly in states like Tamil Nadu, Gujarat, Punjab, and Maharashtra [11]. Despite their importance, SMEs face resource constraints that limit their ability to implement sustainable or circular supply chain practices. Financial constraints, including limited access to credit and high upfront investment requirements for recycling infrastructure, are major hurdles [14]. Technological limitations, such as outdated machinery and a lack of digital tracking systems, further restrict the operationalization of CSCs [13].

Additionally, SMEs often suffer from managerial and informational barriers. Managers may have limited awareness of circular supply chain principles or perceive adoption as a risky, low-return venture [1]. Cultural factors, such as resistance to change and reliance on traditional production methods, also hinder transformation. Finally, policy and regulatory gaps—such as inconsistent enforcement of environmental regulations, lack of incentives, and absence of standardised waste management frameworks—limit SMEs' ability to engage in circular practices [10]. Collectively, these factors demonstrate why SMEs require tailored strategies and policy interventions to facilitate the transition to circular supply chains

*Barriers to CSC Implementation (Global Evidence)*

The literature identifies technological, financial, managerial, cultural, and regulatory barriers to CSC adoption across industries:

**Technological barriers** include the absence of infrastructure for material recovery, inadequate product tracking systems, and limited access to eco-friendly machinery [13], [5].

**Financial barriers** involve high initial investment costs and uncertain returns from circular initiatives, which are particularly restrictive for SMEs with tight capital budgets [14].

**Managerial and cultural barriers** relate to limited strategic vision, lack of leadership commitment, resistance to change, and low awareness of circular practices [2].

**Regulatory and institutional barriers** include weak enforcement of environmental policies, absence of incentives for SMEs, and limited support from industry associations [1], [10].

While these barriers have been extensively documented in developed economies, empirical evidence for Indian textile SMEs remains sparse. Most studies either focus on large corporations or examine manufacturing in broad terms, leaving a critical knowledge gap regarding sector-specific challenges in resource-constrained settings [3], [11].

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# RESEARCH OBJECTIVES

*Research Aim*

The primary aim of this study is to investigate the barriers to Circular Supply Chain (CSC) adoption in Indian textile SMEs. While circular supply chains are increasingly recognized as a key strategy for sustainability and resource efficiency in global supply chains, their adoption in emerging economies—particularly among SMEs—remains limited, fragmented, and poorly understood. SMEs, which dominate India's textile sector, face unique challenges in integrating circular practices due to constraints in financial resources, technical capabilities, managerial expertise, and regulatory support.

This study addresses this gap by systematically exploring operational, managerial, and ecosystem-level factors influencing CSC implementation, providing both empirical insights and practical recommendations for managers and policymakers.

*Research Objectives*

**Assess awareness of CSC concepts among textile SMEs:** Evaluate managers' and staff's understanding of circular economy principles—reuse, remanufacturing, recycling, and closed-loop supply chains—and their relevance to textile operations.

**Identify barriers to CSC adoption:** Examine internal constraints (financial, technological, human resources, managerial inertia) and external constraints (policy gaps, weak regulation, market pressures, supply chain misalignment).

**Understand managerial perspectives on CSC feasibility and value:** Explore perceptions of costs, expected returns, operational feasibility, and strategic alignment to gauge organizational readiness.

**Explore ecosystem-level enablers:** Assess the role of policies, industry associations, partnerships, and technology providers in supporting and accelerating CSC adoption.

*Rationale for Objectives and Questions*

The chosen objectives and research questions are guided by:

Research gap identification: While global literature highlights barriers to CSC adoption, empirical studies focusing on Indian textile SMEs remain limited.

Sector-specific relevance: SMEs dominate India's textile sector and play a crucial role in economic growth and environmental outcomes. Understanding their constraints and enablers informs both managerial practice and policy development.

Exploratory approach: Given the underexplored nature of CSC adoption in Indian SMEs, a qualitative approach facilitates rich, contextual insights rather than relying on predefined assumptions.

Practical applicability: Insights derived from the objectives and research questions can guide managers and policymakers in designing targeted interventions, incentive mechanisms, and capacity-building programs to support circular transitions.

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## RESEARCH METHODOLOGY

*Research design*

This study adopts an exploratory qualitative research design to examine the barriers to Circular Supply Chain (CSC) adoption in Indian textile SMEs. Qualitative research is particularly appropriate when the objective is to understand complex, context-specific, and underexplored phenomena, such as SME practices in emerging economies. Unlike quantitative methods, which focus on numerical measurement, qualitative research allows for rich, descriptive insights into managerial perspectives, organizational practices, and perceptions of feasibility, which are crucial for understanding the nuanced challenges of circular transitions.

The study takes a multiple case study approach, examining SMEs operating in manufacturing, dyeing and processing segments. This approach allows for comparative analysis across different organizational contexts, highlighting both common and unique barriers in adopting circular supply chains. SMEs were selected to ensure diversity in size, operational maturity, regional distribution, and market orientation, providing a holistic understanding of sector-specific challenges.

*Sampling strategy*

A purposive and criterion-based sampling strategy was employed. SMEs were selected based on the following criteria:

Active involvement in textile manufacturing, dyeing and processing.

Existence of basic supply chain operations, such as procurement, production, and distribution.

Within each SME, key informants included operations managers, supply chain heads, production managers and plant supervisors, as they hold detailed knowledge about operational processes, resource allocation, and organizational decision-making. Selecting multiple respondents from each SME ensures data triangulation and reduces the risk of individual bias.

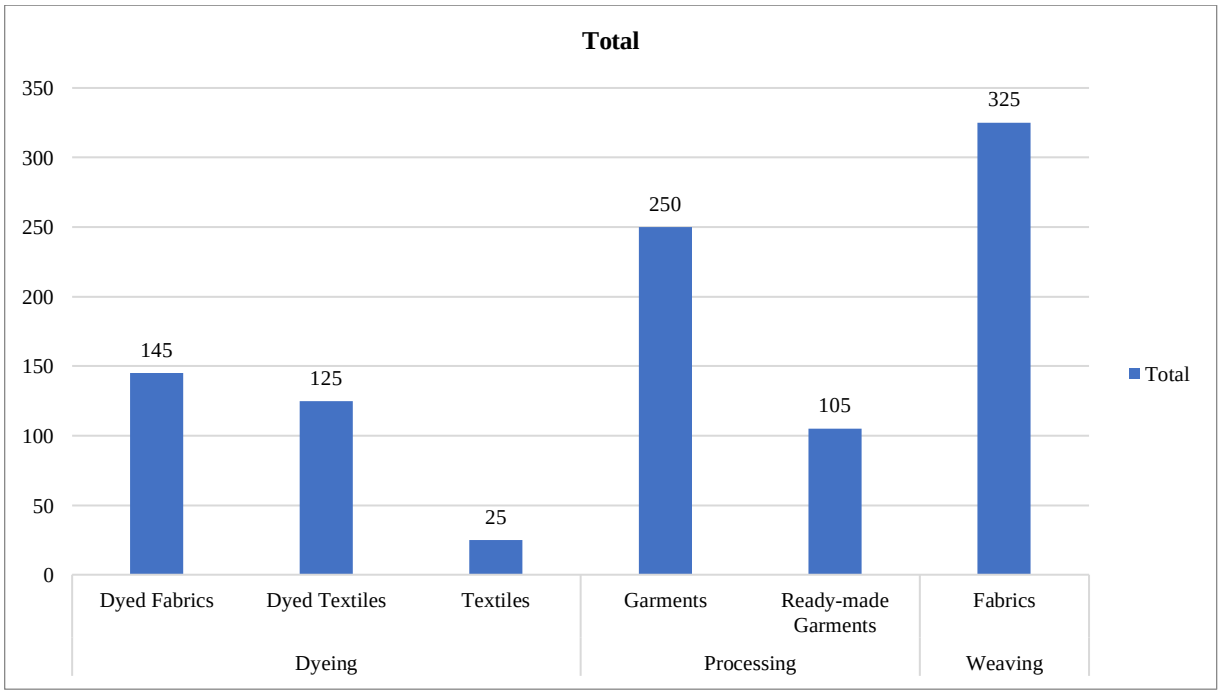


Fig 1 Sector-wise Production Output of Textile SMEs

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*Data Collection*

Semi-structured interviews were the primary data collection method. This approach allows researchers to balance structure with flexibility: core questions ensure alignment with research objectives, while open-ended probes allow participants to elaborate on emergent themes. The interview protocol was developed based on insights from the literature review, particularly focusing on the barriers identified in Indian and global contexts.

The interviews explored five broad domains:

Awareness and understanding of circular supply chain principles: exploring knowledge of CE concepts, eco-design, reverse logistics, and material loops.

Internal resource and capability assessment: examining financial capacity, technical infrastructure, managerial commitment, and workforce skills.

Operational, financial, technological, and managerial challenges: identifying constraints that hinder circular practices, including equipment limitations, high implementation costs, and workflow rigidity.

External ecosystem influences: assessing regulatory frameworks, policy support, industrial partnerships, and market pressures.

Perceived benefits, risks, and feasibility: understanding management perceptions of cost-benefit tradeoffs, competitive advantage, and sustainability alignment.

*Data Analysis.*

Ensuring Reliability and Validity

Ensuring reliability and validity is crucial to establish the credibility and trustworthiness of qualitative research. In this study, multiple strategies were employed to strengthen methodological rigor and minimize researcher bias.

Reliability was maintained through a systematic and transparent research design. A uniform semi-structured interview guide was used for all 23 SME respondents to ensure procedural consistency. Detailed documentation of the research process—including data collection, coding, and theme development—was maintained as an audit trail, allowing the study to be replicable. Moreover, the coding process was cross-verified by independent academic reviewers to ensure consistency and coherence between themes and underlying data.

Validity was enhanced through methodological triangulation and respondent validation. Triangulation was achieved by comparing data from SMEs operating in different textile clusters across Tamil Nadu, thereby capturing variations in scale, management style, and resource availability. Member checking was conducted by sharing summarized interpretations with selected participants, ensuring that the researcher's conclusions accurately reflected their perspectives. Peer debriefing with academic mentors further ensured analytical transparency and interpretive accuracy.

Additionally, the study adopted reflexivity throughout the research process, wherein the researcher continuously reflected on personal assumptions, biases, and positionality to maintain objectivity. Together, these practices ensured that the findings are both dependable and credible, meeting qualitative research standards of reliability, validity, and authenticity.

Ethical Considerations

Ethical compliance was an integral part of the research design, ensuring that participants' rights, dignity, and confidentiality were fully protected in accordance with institutional ethical guidelines.

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Before data collection, informed consent was obtained from all participants after clearly explaining the study's purpose, procedures, and voluntary nature of participation. Respondents were assured of their right to withdraw at any stage without any consequence. Anonymity was maintained by assigning codes (SME 1–SME 23) instead of using company or individual names, thereby protecting organizational identities and sensitive commercial data. The research process upheld the principles of honesty, transparency and integrity, avoiding any form of manipulation or coercion.

Given that the research was conducted across Tamil Nadu, cultural and linguistic sensitivity was maintained by conducting interviews in the participants' preferred language (Tamil or English), ensuring clear understanding and comfort. Throughout the study, the researcher adhered to the ethical norms of respect, voluntary participation, confidentiality, and academic responsibility.

## LIMITATIONS OF THE METHODOLOGY

While the qualitative exploratory approach provides rich insights, it is important to acknowledge its limitations:

**Sample size constraints:** Findings are based on 23 SMEs and may not generalize across the entire Indian textile sector.

**Subjectivity:** Interpretation of qualitative data may introduce researcher bias; this can be mitigated through techniques such as triangulation and member checking.

**Regional bias:** SMEs are concentrated in certain industrial clusters; practices in other regions may vary.

**Time constraints:** Semi-structured interviews are time-intensive, which limited the total number of participants.

Despite these limitations, the methodology is well-suited for uncovering underexplored barriers, generating actionable insights, and laying a foundation for future large-scale studies.

## RESULTS & FINDINGS

This section presents the key findings derived from interviews with 23 textile SMEs located across Tamil Nadu. The results were analyzed thematically, identifying major categories of barriers affecting the adoption of Circular Supply Chain (CSC) practices. The findings reveal six dominant barrier themes: financial, technological, managerial/organizational, behavioral, regulatory, and awareness-related.

*Awareness and understanding of CSC*

Nearly all SMEs cited financial limitations as a primary obstacle. Establishing circular processes such as recycling, remanufacturing, or closed-loop production was perceived as cost-intensive. Many firms reported inadequate capital, limited access to credit, and lack of financial incentives to invest in sustainable technologies.Several managers indicated that available funds were prioritized for immediate operational needs rather than long-term sustainability goals.

Table 1 Awareness of CSC Concepts among Textile SMEs (n = 23)

| Awareness Level | No. of SMEs | Percentage (%) | Description |
|---|---|---|---|
| Low / Minimal Understanding | 15 | 65% | Limited familiarity with CE principles; minimal training. |

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|---|---|---|---|
| Moderate Awareness | 6 | 26% | Aware of CE ideas but not widely applied. |
| High Awareness | 2 | 9% | Small steps of reuse/recycling implemented. |

Thus, high initial investment costs, absence of green financing, and perceived financial risks collectively emerged as the most prominent barriers to CSC adoption.

*Internal Organizational Barriers*

The majority of SMEs operated with outdated machinery and limited digital infrastructure. Many lacked access to affordable technologies for waste segregation, reverse logistics tracking, or digital monitoring of material flows.

Table 2 Major Technological Barriers among SMEs (n = 23)

| **Technological Limitation** | **No. of SMEs Reporting** | **Percentage (%)** |
|---|---|---|
| Outdated machinery / infrastructure | 18 | 78% |
| Absence of digital tracking or automation | 14 | 61% |
| Unavailability of affordable recycling technology | 11 | 48% |
| Limited technical expertise | 9 | 39% |

Even where interest existed, technological unavailability or high costs restricted adoption. Smaller firms depended heavily on manual processes, further reducing efficiency.

These findings indicate that technological gaps, along with inadequate infrastructure and limited technical support, hinder the implementation of circular practices in Tamil Nadu's textile SMEs.

*Financial & Infrastructural Challenges*

SMEs consistently reported financial limitations as a major barrier:

**High capital investment**: Costly machinery for recycling, eco-friendly production, and digital tracking was unaffordable (SME14, SME20).

**Limited access to finance**: Banks rarely provide loans for circular initiatives; cash flow constraints are common (SME16, SME19).

**Inadequate infrastructure**: Storage, sorting, and reverse logistics systems were often absent or insufficient (SME17, SME22).

These findings mirror global evidence that **financial and infrastructural challenges** significantly hinder circular transitions in SMEs.

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Table 3 Frequency of Reported Financial and Infrastructure Challenges among SMEs (n = 23)

| Financial / Infrastructure Challenge | No. of SMEs Reporting | Percentage (%) |
|---|---|---|
| High initial investment cost | 20 | 87% |
| Limited access to green finance | 17 | 74% |
| Inadequate infrastructure (storage/logistics) | 15 | 65% |
| Cash-flow constraints | 13 | 57% |

*Ecosystem & Policy-Level Gaps*

External factors influencing CSC adoption include:

**Weak policy support**: Respondents noted limited incentives and inconsistent government enforcement (SME12, SME21).

**Insufficient industry guidance**: Associations rarely provide training, best practices, or collaborative platforms (SME11, SME20).

**Lack of standardization**: SMEs reported unclear regulations and absence of benchmarks for circular practices (SME19, SME23).

Table 4 Policy and Regulatory Gaps Identified by SMEs (n = 23)

| Regulatory / Policy Issue | No. of SMEs Reporting | Percentage (%) |
|---|---|---|
| Weak enforcement / unclear guidelines | 14 | 61% |
| Lack of incentives for circular initiatives | 12 | 52% |
| Complex procedures for subsidy access | 10 | 43% |
| Absence of standardized benchmarks | 8 | 35% |

These findings align with Institutional Theory, which posits that regulatory, normative, and mimetic pressures influence organizational adoption of innovations.

*Managerial Perceptions and Resistance*

Managers often perceived CSC adoption as risky, costly, and disruptive, leading to hesitation. Perceived lack of immediate ROI, combined with fear of operational disruptions, highlights behavioral and strategic barriers to CSC adoption, consistent with literature.

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Table 5 Managerial and Organizational Constraints among SMEs (n = 23)

| Organizational / Managerial Barrier | No. of SMEs Reporting | Percentage (%) |
|---|---|---|
| Weak leadership / commitment | 13 | 57% |
| Focus on short-term profits | 10 | 43% |
| Lack of strategic planning | 9 | 39% |
| Resistance from employees | 8 | 35% |

## DISCUSSION

*Linking Findings to Literature*

Our results resonate with prior studies showing that awareness, internal resources, financial constraints, and external support systems are critical determinants of CSC adoption in SMEs. The lack of understanding of circular principles, combined with resource scarcity and weak institutional support, reproduces the barriers reported in other emerging economies.

*Theoretical Interpretation*

**RBV perspective**: Internal resources—financial capital, technological capability, human skills—directly influence SMEs' ability to implement circular strategies. Limited resources hinder adoption, consistent with RBV predictions.

**Institutional Theory perspective**: External pressures, including regulatory enforcement, normative expectations, and mimetic influences, shape managerial behavior. Weak policies and industry guidance limit adoption, highlighting institutional constraints.

*Managerial Attitudes*

Managers are generally aware but cautious, balancing perceived benefits against operational risks and costs. This indicates that capacity-building, risk mitigation strategies, and demonstrable ROI are essential to facilitate adoption. Behavioral resistance and organizational inertia must be addressed alongside financial and infrastructural support.

## RECOMMENDATIONS

*Summary of Key Findings*

This exploratory qualitative study investigated barriers to Circular Supply Chain (CSC) adoption in Indian textile SMEs. The main findings are:

**Low Awareness and Knowledge Gaps**: Most SMEs have limited understanding of CSC principles, including 3R practices, eco-design, and reverse logistics. Awareness deficits contribute to managerial hesitation and low prioritization of circular initiatives.

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**Internal Organizational Barriers**: Rigid production workflows, lack of trained personnel, and managerial resistance to change impede CSC implementation. Organizational inertia and risk aversion were consistently reported.

**Financial and Infrastructural Challenges**: High capital investment requirements for recycling, remanufacturing, and digital tracking, combined with limited access to green financing, restrict circular transitions. Inadequate infrastructure for material recovery and reverse logistics further exacerbates the problem.

**Ecosystem and Policy-Level Gaps**: Weak regulatory enforcement, lack of targeted incentives, limited industry guidance, and absence of standardization create external barriers. SMEs reported minimal support from government and industry associations.

**Managerial Perceptions and Resistance**: While some managers recognize long-term benefits, most perceive circular initiatives as risky, costly, and operationally disruptive. Behavioral and strategic concerns significantly influence adoption decisions.

Collectively, these findings underscore that CSC adoption in Indian textile SMEs is constrained by an interplay of internal resource limitations, managerial attitudes, and weak institutional support, consistent with Resource-Based View (RBV) and Institutional Theory perspectives.

*Practical Recommendations*

**Capacity-Building and Training**: Conduct workshops and in-house training to improve awareness of circular practices and their operational benefits.

**Incremental Implementation**: Start with low-cost circular initiatives, such as material segregation, small-scale recycling, or eco-design prototypes, to demonstrate ROI and build confidence.

**Collaborative Networks**: Partner with local suppliers, recyclers, and technology providers to share resources, reduce costs, and facilitate knowledge transfer.

**Internal Process Optimization**: Re-engineer workflows to incorporate circular practices without disrupting production, supported by clear managerial commitment.

**Digital Enablement**: Adopt low-cost digital tools for inventory tracking, waste monitoring, and reverse logistics to gradually enhance technological capability.

*Policy Recommendations*

To facilitate the adoption of circular supply chains among textile SMEs, several strategic measures can be implemented. Financial incentives from government and financial institutions, such as low-interest loans, subsidies, or grants, can support SMEs in investing in circular infrastructure. In addition, regulatory support should be strengthened through clear guidelines, enforceable standards, and environmental regulations specifically tailored for SMEs. Industry support programs, provided by associations, can offer training, benchmarking, and collaborative platforms for knowledge exchange. Furthermore, public-private partnerships can help develop shared recycling facilities or material recovery centers, thereby reducing the individual burden on SMEs. Finally, awareness campaigns at national and state levels can enhance understanding of circular economy benefits and promote the adoption of global best practices

*Future Research*

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For future research, several avenues can help deepen understanding and validate the findings of this study. Quantitative validation using surveys with larger samples can measure the prevalence and impact of the barriers identified in this study. Cross-sector comparisons across different manufacturing industries can reveal sector-specific challenges and potential solutions. Longitudinal analyses tracking SMEs over time can assess how barriers evolve and determine which interventions are most effective. Additionally, technology integration studies can examine the adoption of Industry 4.0 technologies in circular supply chains among resource-constrained SMEs. Finally, behavioral research focusing on managerial attitudes, risk perception, and cultural factors can provide insights into the human and organizational dimensions influencing CSC adoption.

## CONCLUSION

This study examined the barriers to Circular Supply Chain (CSC) adoption in Indian textile SMEs, highlighting the complex internal and external challenges they face. Organizational constraints such as limited awareness, managerial expertise, resource scarcity, and reliance on linear models hinder adoption, while financial and technological limitations further exacerbate the problem. External factors, including regulatory ambiguity, weak policy enforcement, and limited institutional support, also restrict SMEs' ability to align with circular practices.

The findings reinforce the Resource-Based View (RBV), emphasizing the importance of internal capabilities, and Institutional Theory, highlighting the role of external pressures in shaping adoption. CSC adoption in Indian textile SMEs is therefore not merely a technical issue but a multifaceted organizational and institutional challenge. Addressing these interlinked barriers is essential for promoting sustainable practices, reducing environmental impact, and enhancing long-term competitiveness. This study contributes empirical insights into sector-specific challenges and lays a foundation for future research on strategies and interventions to support circular transitions in emerging economies.

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