



वस्त्र मंत्रालय
MINISTRY OF
TEXTILES



Co-funded by
the European Union

Global
Gateway



Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

Implemented by

giz

Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

GUIDEBOOK ON CIRCULAR OPPORTUNITIES FOR MSMEs in the Indian Textile Sector

Knowledge Partner



Published by:

EU-India Resource Efficiency and Circular Economy Initiative (EU-I RECEI) in collaboration with the Ministry of Textiles, Government of India
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH India
A2/18, Safdarjung Enclave
New Delhi, India - 110029
T: 011 49495353
I: www.giz.de/India

Responsible:

Dr Rachna Arora
Team Leader, EU-I RECEI
Director, Climate Change and Circular Economy, GIZ India
rachna.arora@giz.de

Authors:

Ms Anita Ahuja, IPE Global
Mr Sanjay Gupta, GOPA Tech GmbH
Ms Nele Kapp, GOPA Tech GmbH

Reviewers:

Dr Reva Prakash, Environmental Policy and Resource Efficiency Advisor, GIZ India
Mr Vivek JM, Environmental Policy and Resource Efficiency Advisor, GIZ India

As of:

July 2026

On behalf of the:

The Ministry of Textiles, Government of India, European Union (EU) and the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN)

About EU-I RECEI:

The EU-India Resource Efficiency and Circular Economy Initiative (EU-I RECEI) is co-funded by the European Union (EU) and the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), and is jointly implemented with the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. The project is implemented by GIZ India in close collaboration with the Ministry of Textiles, Government of India.

Disclaimer:

This publication is produced with the cooperation of the EU-India Resource Efficiency and Circular Economy Initiative (EU-I RECEI). Its contents are the sole responsibility of authors, and do not necessarily reflect the views of the Ministry of Textiles, Government of India, the European Union, or the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN). The data and information used for preparing this report have been sourced from secondary sources. While due care has been taken to ensure the authenticity of the data and other information used, any inadvertent wrong data or information used is regretted. We are not liable to any legal or penal responsibilities arising from this and from the use of this document by anyone. Reproduction is authorized provided the source is acknowledged.

आरती कंवर, भा.प्र.से.
अपर सचिव
Arti Kanwar, I.A.S.
Additional Secretary



भारत सरकार
वस्त्र मंत्रालय
Government of India
Ministry of Textiles

FOREWORD

Textiles have long been integral to India's economic progress, cultural identity and entrepreneurial tradition. Today, the textile and apparel sector stands among the largest in the world, supporting millions of livelihoods and contributing significantly to manufacturing, exports and employment. At the heart of this success is the country's vibrant network of micro, small and medium enterprises (MSMEs), whose ingenuity and resilience have sustained the sector's growth across generations. As India advances the vision of Mission LiFE, empowering these enterprises to adopt resource-efficient and circular business practices will be central to strengthening the sector's competitiveness in an evolving global marketplace.

It is in this context that the, 'Guidebook for Circular Opportunities for MSMEs in the Indian Textile Sector', assumes particular significance. Rather than presenting circularity as a theoretical concept, the guidebook adopts a practical and structured approach to help enterprises translate intent into action. Beginning with the fundamentals of resource efficiency and circular economy, it explains the evolving regulatory and market landscape before guiding MSMEs through topics such as traceability, Digital Product Passports, environmental and regulatory compliance, circular business models and available government support. Through practical tools, waste audit checklists, case studies, standard operating procedures and a step-by-step Circular Action Roadmap, it equips enterprises to assess their current practices, identify opportunities for improvement and prepare confidently for evolving domestic and international market expectations.

I commend the EU-I RECEI project, GIZ India and all partner organisations, experts and stakeholders for bringing together this valuable resource. By combining technical guidance with practical implementation tools, this guidebook will serve as a useful reference for MSMEs, industry associations and other stakeholders seeking to strengthen resource efficiency, improve compliance readiness and enhance competitiveness. It represents a meaningful contribution to the Government's vision of building a globally competitive, sustainable and future-ready textile sector.

I extend my best wishes for the successful dissemination and widespread adoption of this guidebook.


(Arti Kanwar)



EUROPEAN UNION
DELEGATION TO INDIA AND BHUTAN

FOREWORD EU Delegation

The global textile and apparel sector is entering an important phase of greening transformation, with circular economy approaches creating new opportunities for innovation, resource efficiency, green jobs and sustainable growth. The textile and apparel sector is a critical economic pillar of India's economy, contributing significantly to employment generation, industrial output, and exports. The European Commission's Ecodesign for Sustainable Products Regulation (ESPR) identifies the textiles sector as a priority area for the EU's circular economy transition. It mandates strict sustainability standards, a ban on the destruction of unsold apparel, and introduces the Digital Product Passport (DPP) to track a textile item's environmental footprint across its lifecycle. The Free Trade Agreement recently agreed between the European Union and India will offer good opportunities for India to increase its market shares in Europe. As markets increasingly prioritise traceability, responsible sourcing, low-carbon production, and circularity, the future competitiveness of the sector will depend not only on scale and cost efficiency, but also on its ability to demonstrate sustainability, compliance, and resilience.

The European Union (EU) and India share a strong partnership in advancing resource efficiency and the circular economy, which is key to sustainable growth and effective climate action. The EU Strategy for Sustainable and Circular Textiles sets out a vision for 2030 in which textile products placed on the European market are durable, repairable and recyclable, contain a significant share of recycled fibres, are free from hazardous substances, and are produced in a manner that respects social rights and environmental standards. For Indian textile exporters, this transition will require greater attention to traceability, recycled content, ecodesign, product durability and repairability, waste minimisation, chemical safety, and the use of credible and verifiable sustainability claims.

India's textile sector is a vital source of employment, with micro, small, and medium enterprises (MSMEs) forming its backbone. I would like to congratulate the EU-India Resource Efficiency and Circular Economy Initiative (EU-IRECEI) for preparing the "**Guidebook for Circular Opportunities for MSMEs in the Indian Textile Sector**" which will serve as a practical guidance resource for textile MSMEs in India. The guidebook prepared under the EU-IRECEI funded by the European Union and the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), implemented by GIZ India in close cooperation with the Ministry of Environment, Forest and Climate Change (MoEFCC) and Ministry of Textiles, Government of India provides MSMEs with structured guidance applicable across enterprises of varying size and readiness, supporting their transition from awareness on circularity to concrete action. It introduces key concepts of resource efficiency

and circular economy in a simplified manner and provides MSMEs with structured tools to identify resource losses, reduce waste, improve documentation, and prepare for emerging sustainability and traceability requirements.

The Delegation of the European Union to India would like to thank the Ministry of Textiles, Government of India for its continued collaboration and reaffirms its commitment to support India's sustainable textile transition as well as strengthening the EU-India partnership in this key economic sector. I hope this guidebook serves as a practical resource for MSMEs as they advance their actions towards a more circular and resource-efficient future.

Franck Viault
Minister Counsellor
Head of Cooperation



Embassy
of the Federal Republic of Germany
New Delhi

FOREWORD

Taina Dyckhoff, Counsellor for Climate and Environment, German Embassy New Delhi

India and Germany have a long-standing partnership built on a common commitment to sustainable development, climate action and responsible resource management. Through the Indo-German Green and Sustainable Development Partnership (GSDP), India and Germany are aligning the cooperation towards the achievement of our shared global climate and sustainability goals. The transition to a circular economy is central to this shared agenda. As industries worldwide transition towards more circular and resilient models, the textile sector stands at the forefront of this transformation due to its economic importance, environmental footprint and potential for innovation.

The National Circular Economy Strategy (NKWS) of Germany gives specific attention to clothing and textiles, advancing circular economy practices for responsible production and consumption. A draft action programme for the implementation of NKWS was adopted by the German Federal Cabinet in June 2026 and identifies twelve priority measures to be advanced by the end of 2027, with a focus on accelerating implementation, supporting innovation, strengthening industry engagement and promoting practical circular economy solutions.

India's textile sector, driven largely by Micro, Small and Medium Enterprises (MSMEs), is a cornerstone of supporting livelihoods, manufacturing and global trade. This **"Guidebook for Circular Opportunities for MSMEs in the Indian Textile Sector"** is a timely and practical contribution. The guidebook recognises that MSMEs need usable tools and guidance to enable them in adopting, implementing and tracking resource efficiency, worker wellbeing, compliance and traceability along the value chain. I congratulate Circular Economy Solutions Preventing Marine Litter in Ecosystems and EU-India Resource Efficiency and Circular Economy Initiative (funded by the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) and co-funded by the European Union implemented jointly with Ministry of Environment, Forest & Climate Change, Government of India) for preparing this guidebook.

Germany remains committed to supporting India's circular economy transition through knowledge exchange, innovation and strong institutional partnerships. Circular economy is as much a policy priority as it is a business opportunity, a climate solution and a pathway to more sustainable livelihoods. The German Embassy and BMUKN would like to take this opportunity to thank the Ministry of Textiles, Government of India for its continued support for the cooperation without which this guidebook preparation would not have been possible.

I would like to appreciate the partners involved in developing this guidebook and hope it will serve as a practical companion for textile MSMEs across India as they move towards cleaner production, stronger resource efficiency and a more circular future.

Taina Dyckhoff

YOUR JOURNEY WITH THIS GUIDEBOOK

A guide to navigating textile resource efficiency & circularity

- Learn the essentials of circular economy, global regulations, and national compliance frameworks shaping the textile sector.
- Discover real-world case studies, cluster-level practices, and MSME innovations leading the shift toward sustainability.
- Get practical steps, checklists, and tools MSMEs can adopt today - from waste segregation to certification readiness.
- Find pathways to networks, government schemes, and buyer requirements that support long-term circular transitions.

This guidebook won't give ready-made solutions, instead equips you with direction, examples, and practical tools to make informed choices.

Use this guidebook as your navigation guide to move from awareness to action, and from action to circular leadership.



ABOUT THE GUIDEBOOK

EU-India Resource Efficiency and Circular Economy Initiative (EU-I RECEI)

About: The EU-India Resource Efficiency and Circular Economy Initiative (EU-I RECEI) is a co-financed project between the European Union (EU) and the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) promoting circular economy and resource efficiency in textiles, plastics and e-waste sectors.

Aim: To support policy alignment, pilot cluster-level circular solutions, build MSME guidebook and capacity, and foster EU-India industry partnerships.

Impact: Stronger compliance, modernised recycling clusters, greater inclusion of informal workers, and enhanced global market access for MSMEs.

GUIDEBOOK SECTIONS



OVERVIEW of the
guidebook



FACTSHEET for Textile
Sector RE-CE Approach



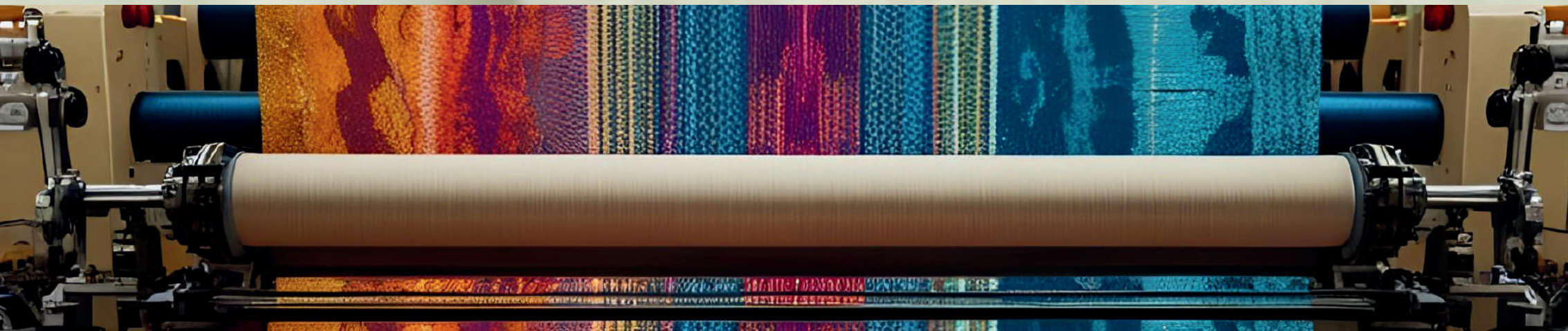
**SCHEMES, SUPPORT, &
COLLABORATIONS**
for RE-CE



WASTE AUDIT Checklist



**CASE STUDIES & CLUSTER
Best Practices**



OVERVIEW OF THE GUIDEBOOK

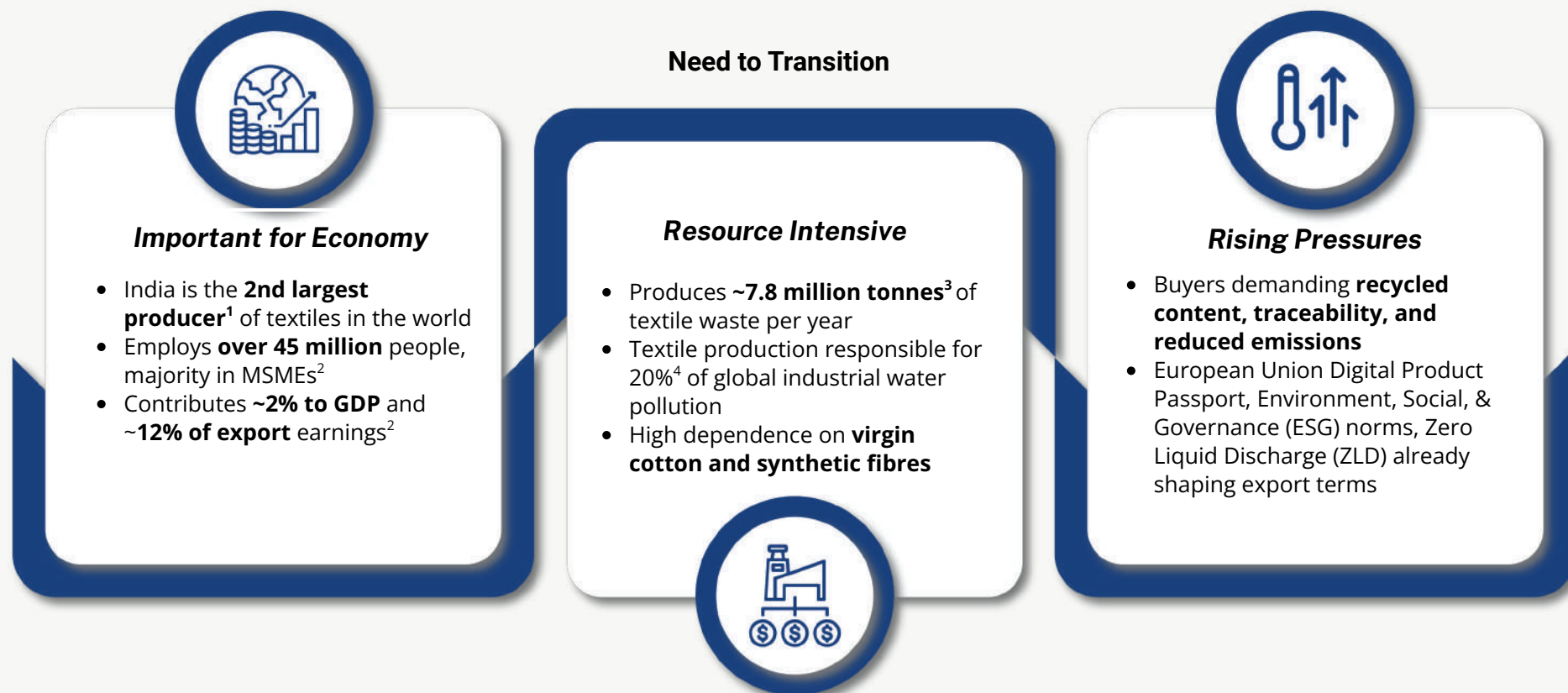
1. OVERVIEW

1.1. Why This Guidebook, Why Now?	10
1.2. Why Textile Circularity Matters.....	11
1.3. What the it Aims to Do.....	15
1.4. Scope and Audience.....	17
1.5. About the Section.....	19
1.6. How to Use the Guidebook	20
1.7. Circular Action Roadmap - Applying the Guidebook.....	21

1.1 WHY THIS GUIDEBOOK, WHY NOW?

India's Textile Sector Needs a Circular Transition

India's textile sector contributes significantly to economic growth and employment yet faces significant environmental challenges due to resource-intensive production processes MSMEs who form the backbone of production often lack access, awareness, and support to transition towards sustainability. This guidebook is developed to provide MSMEs with step-by-step guidance towards transitioning for resource efficiency and circular economy.



1. Press Information Bureau: [Employment in the Textile Industry \(2021\)](#)

2. Press Information Bureau: [Threads of Progress \(2025\)](#)

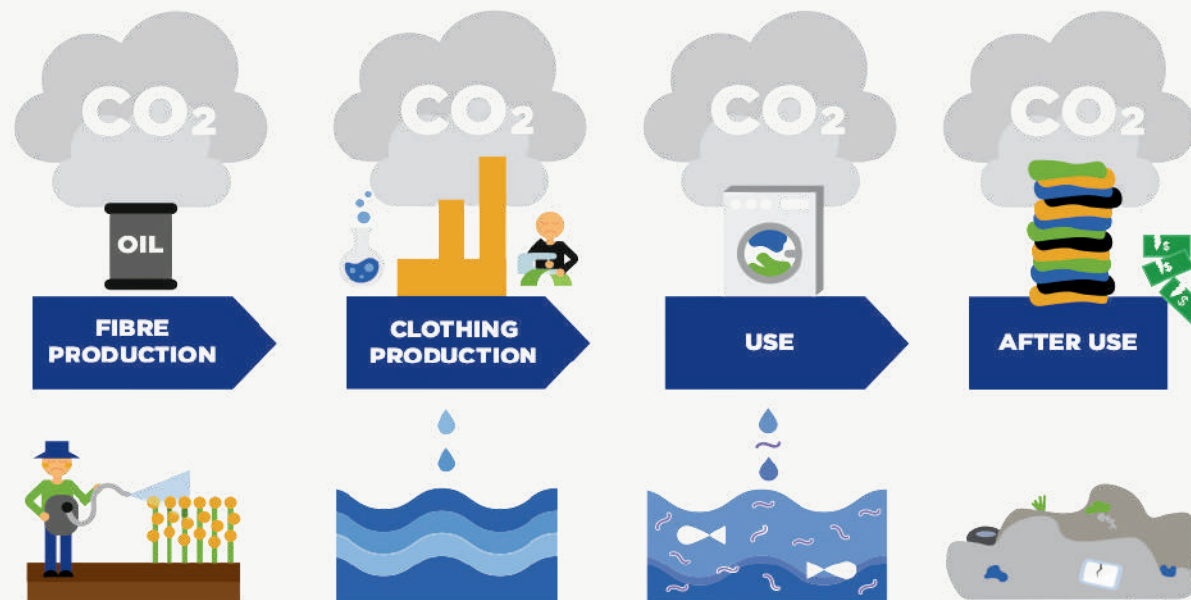
3. Fashion for Good: [The State Of Textile Waste In India](#)

4. Europa Parliament: [Fast fashion: EU laws for sustainable textile consumption](#)

1.2 WHY TEXTILE CIRCULARITY MATTERS

The Problem: Resource Intensive & Waste Generating

Textile manufacturing is one of the most resource-intensive⁴ and waste-generating industry globally⁵. In India alone a large amount of textile waste is generated annually. This isn't just post-consumer waste, but also cutting scraps, defective stock, unsold inventory, most of which never re-enters the production cycle.

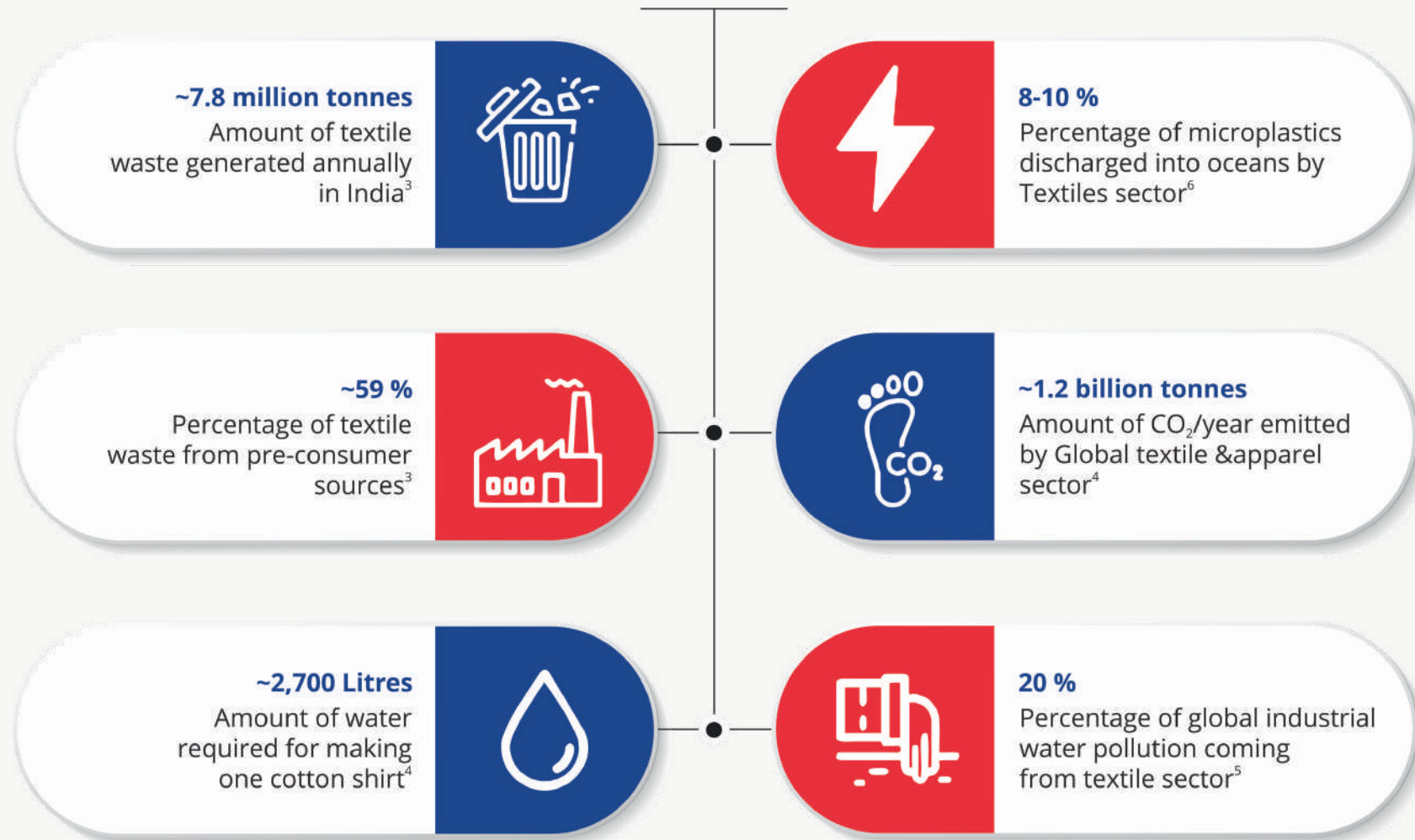


Negative environmental consequences of the current textiles industry
Ellen MacArthur Foundation, 2017

4. Europa Parliament: [Fast fashion: EU laws for sustainable textile consumption](#)

5. United Nations Environmental Programme: [Unsustainable fashion and textiles in focus for International Day of Zero Waste 2025 \(2025\)](#)

The Problem: Resource Intensive and Waste Generating



3. Fashion for Good: [The State Of Textile Waste In India](#)

4. Europa Parliament: [Fast fashion: EU laws for sustainable textile consumption](#)

5. United Nations Framework Convention on Climate Change. [Fashion Industry, UN Pursue Climate Action for Sustainable Development \(2018\)](#)

6. IFC-Textile Sustainability Series <https://www.ifc.org/content/dam/ifc/doc/2023/strengthening-sustainability-in-the-textile-industry-ifc-2023.pdf>

Business Risks & Regulatory Shifts:

Why MSMEs Must Act Now



Rising Regulatory Pressures

- Pollution control in the Indian textile sector remains fragmented and compliance-driven rather than preventive.
- India's textile sector faces weak enforcement, and lacks a dedicated framework, leading to untracked textile waste and environmental leakages
- Ban on hazardous chemicals already enforced by key buyers



Evolving buyer and export market demands

- Proof of environmental and social compliance from MSMEs
- Alignment with UN Sustainable Development Goals (SDGs), ESG frameworks, and brand climate goals
- Alignment with European Union strategy for sustainable and circular textiles
- Eco-design for Sustainable Products Regulation, Digital Product Passport, European Union Waste Directive, and now the Extended Producers Responsibility

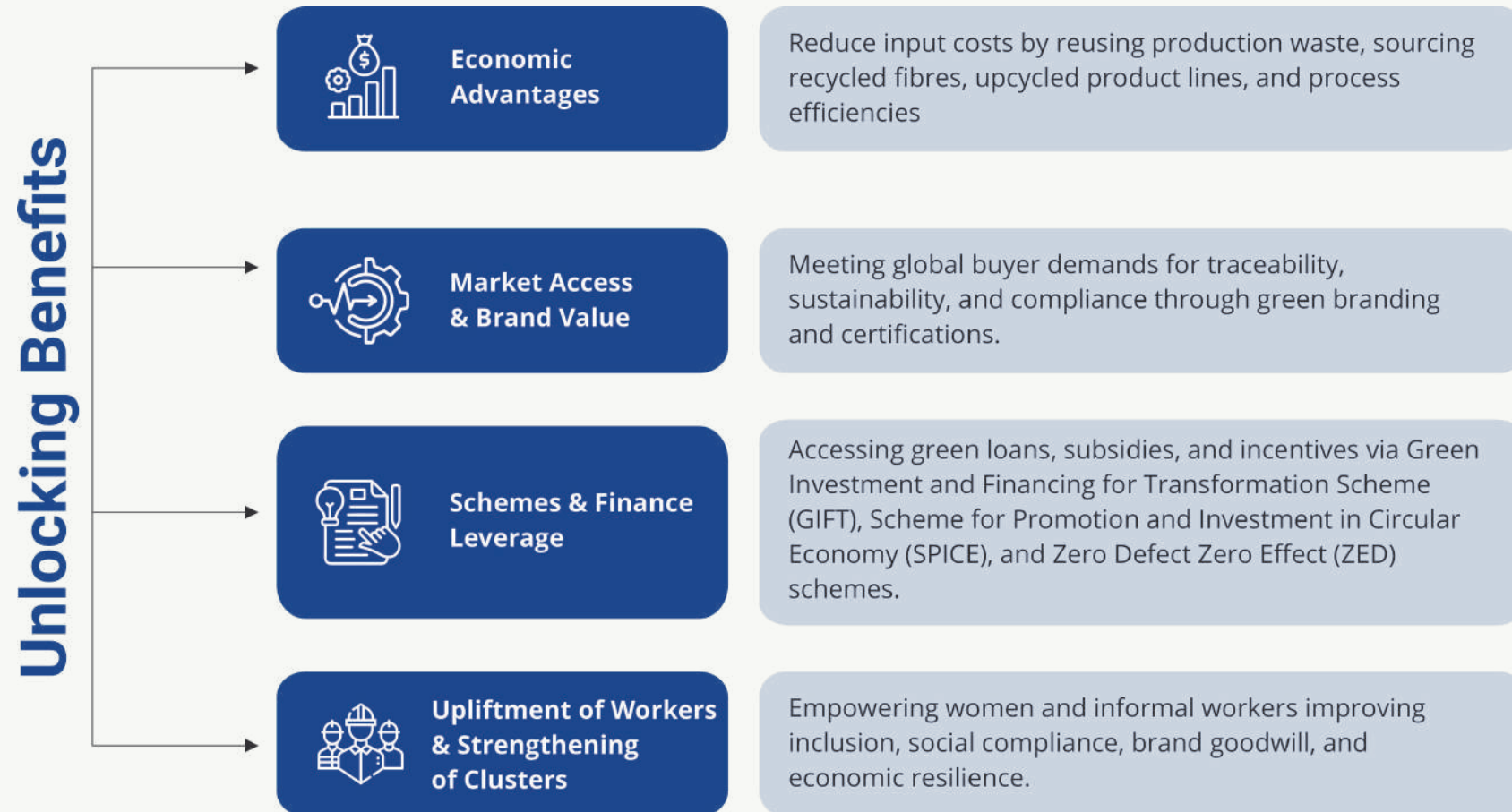


Linear Models = Business Vulnerability

- Rising input costs and supply volatility
- Poor waste practices risk export loss, shutdowns, penalties, and funding bans
- Textile waste is becoming a rising challenge
- Informal labour practices draw negative attention and restrict certifications

THE FUTURE BELONGS TO FORWARD-THINKING MSMES

MSMEs that move early can cut costs, build new revenue lines, and secure long-term buyer trust. In places like Panipat and Tirupur, businesses have already shown this works.



1.3 WHAT THE GUIDEBOOK AIMS TO DO

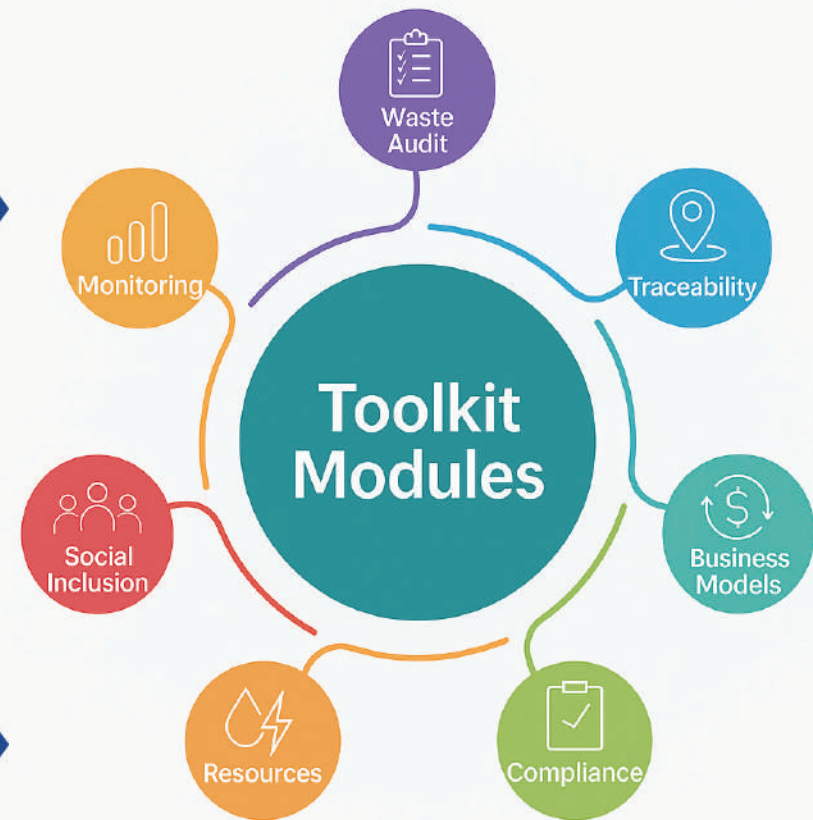
A Practical Guide for Circular Economy in Textiles

The guidebook **aims to**

- Empower textile MSMEs to adopt circular practices
- Builds awareness around critical inefficiencies in textile processes leading to waste
- Simplifies access to government support schemes and compliance frameworks
- Preparing MSMEs to align with evolving global standards

This guidebook **offers**

- Modular sections designed for flexible, need-based learning
- Topics most relevant to textile operations through
- User-friendly templates, checklists, and Standard Operating Procedure (SOPs)
- Real-world case studies from textile hubs
- Enabling pathways for MSMEs for sustainability



Alignment with National & Global Frameworks



The geographical map used is for informational purposes only and does not constitute recognition of international boundaries or regions. GIZ makes no claims concerning the validity, accuracy or completeness of the maps nor assumes any liability resulting from the use of the information therein.

1.4 SCOPE AND AUDIENCE

What does this guidebook cover?

This guidebook focuses on Resource Efficiency and Circular Economy (RE-CE) practices in the Indian textile sector

It is applicable across the entire textile value chain, including:

- Raw material sourcing & spinning
- Weaving, knitting, and processing (dyeing/printing)
- Garment manufacturing
- Textile recycling and upcycling (pre- & post-consumer waste)

Relevant for

- Standalone MSMEs working independently
- Cluster-based units part of industrial parks or associations

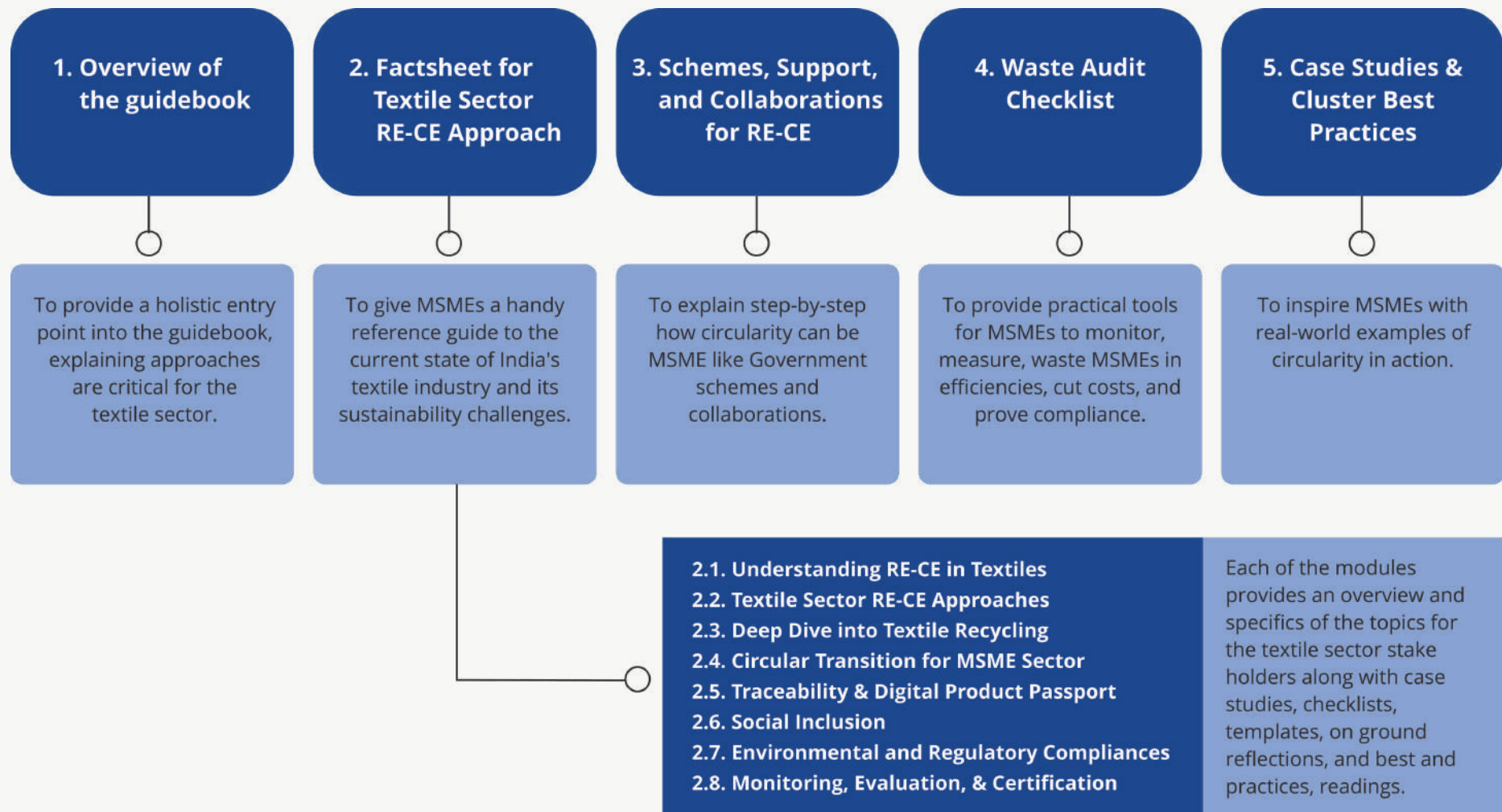
Includes India-specific policy linkages (e.g., MSME GIFT, SPICE) and EU-aligned frameworks (e.g., DPP, circular design, traceability).

Audience of this guidebook



No prior technical background needed. This guidebook is designed to help you take small steps toward big impact

1.5 ABOUT THE SECTIONS



1.6 HOW TO USE THE GUIDEBOOK



1.7 CIRCULAR ACTION ROADMAP - APPLYING THE GUIDEBOOK

Refer back to this once you have gone through the guidebook

This section provides a single, end-to-end activity to help MSMEs translate the ideas in this guidebook into a practical Circular Action Roadmap for their own factory or unit. It brings together the key modules of guidebook—RE-CE basics, waste and material flows, circular business approaches, social inclusion, compliance, and schemes—into a structured, factory-level exercise.

By the end of this activity, your MSME will have:

A shared understanding of where your factory is today on RE-CE (materials, waste, energy, water, people, compliance).

A list of practical circular actions you can start within the next 3–24 months, organised by focus area.

A simple 12–24 month Circular Action Roadmap, showing:

- What actions you will take
- Who is responsible
- When they will be done
- What support (training, finance, partners, schemes)

A first reflection on social inclusion and labour conditions using the C-SELF lens, so that circular transition is also just and worker-centred.

Step 0 – Get Ready for the Activity

Before you start filling the tables, set up a small team and decide how detailed you want to go in this first round.

WHO SHOULD PARTICIPATE?

Try to bring 4-8 people who represent different parts of your unit:

- Business / management: owner, director, or senior manager
- Production: production manager, line supervisor
- Stores / procurement: raw material or inventory in-charge
- HR / compliance / admin: person managing wages, records, audits
- EHS or quality (if available)
- A representative from workers' group (if possible, at least one woman worker)

Before you begin -choose your "depth"

Decide how far you want to go in this first round:

- Starter Round (3-4 hours) → Pick 2–3 focus areas
- Full Round (1 day or 2 days) → Cover all areas with finalising actions

Tables To be Filled - Circular Transition Focus Areas

Table 1 → Raw Materials Sourcing & Design

Table 2 → Waste Reduction & Resource Efficiency

Table 3 → Packaging

Table 4 → Workers' Wellbeing & Skills (Social Inclusion)

Table 5 → Compliance & Regulatory Readiness

Table 6 → Traceability & Digital Product Passport (DPP)

Table 7 → Collaborations & Partnerships

Table 8 → Circular Supply Chain Transition

Tables to be Filled - How to Approach the Tables

Tables and their focus areas as mentioned in previous page.
The actual tables are in the next pages

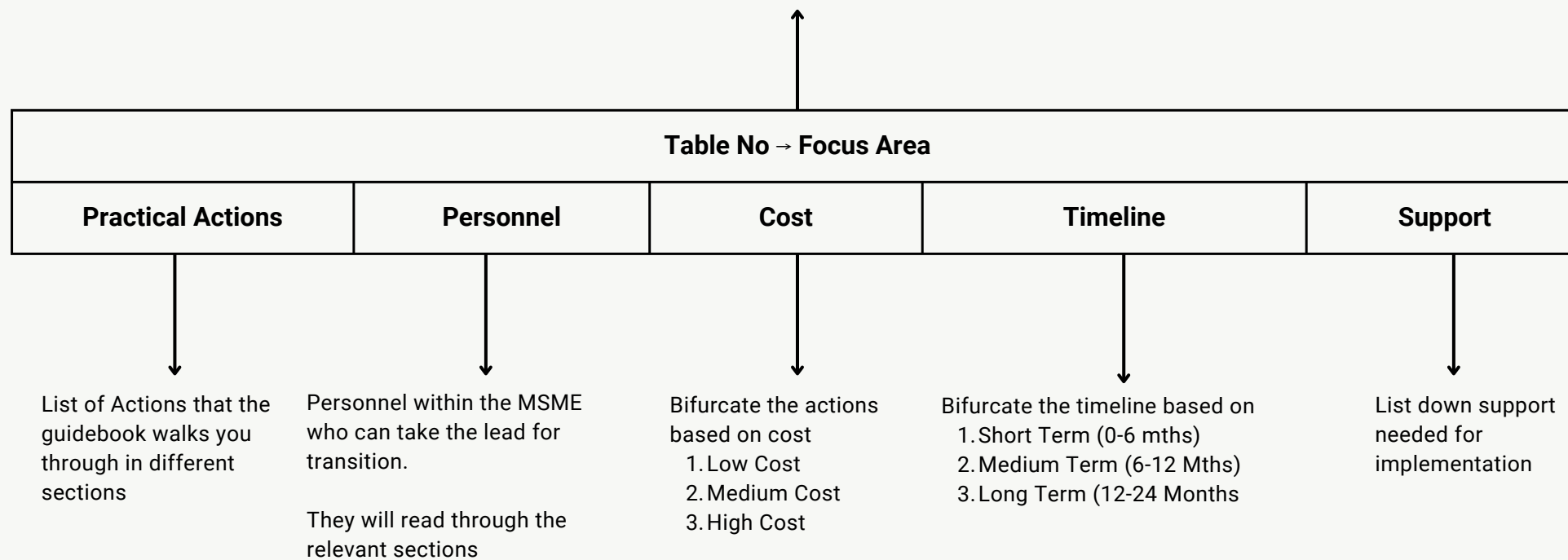


Table 1 → Raw Materials Sourcing & Design

Practical Actions	Personnel	Cost	Timeline	Support
Redesign products to reduce cutting waste through better marker planning and pattern nesting				
Standardise fabric widths, GSM and shade references to minimise offcuts and rejections				
Shift selected styles from multi-fabric constructions to mono-material where performance allows				
Introduce design rules that avoid unnecessary panels, trims and overlays that create waste				
Use leftover fabrics and roll-ends for accessories, linings, inner panels or fillings				
Prioritise purchase of cotton-rich or fibre-consistent fabrics where recycled yarn or future recycling is planned				
Introduce minimum recycled-content yarns in selected product lines (e.g. 10–30% recycled)				
Pilot alternative fibres with lower environmental impact (e.g. BCI / organic cotton, man-made cellulosics, recycled PES)				
Ask key suppliers to share basic fibre, chemical and sustainability information with each fabric lot				
Include basic RE-CE criteria (e.g. recycled content, mono-material, restricted substances) in purchase specifications				
Develop long-term sourcing partnerships with recyclers for recycled fibre/yarn supply				
Consolidate small fabric orders to reduce dead stock and end-of-roll losses				
Introduce standard colour palettes to reduce shade proliferation and small-lot dyeing				
Review trims and accessories and replace difficult-to-recycle items (e.g. PVC prints, mixed-metal trims)				
Develop internal guidelines for “designing for disassembly” (easy removal of buttons, zips, padding)				

Table 2 → Waste Reduction & Resource Efficiency

Practical Actions	Personnel	Cost	Timeline	Support
Conduct a basic material and waste flow mapping across all major processes				
Implement source-level textile waste segregation (by process, fibre type, colour family)				
Introduce 4–6 clearly labelled waste bins in each department (cutting, stitching, finishing, packing, etc.)				
Keep waste dry and off the floor (pallets, tarpaulins, simple racks)				
Separate sweeping dust from spinnable or reusable textile waste				
Introduce a daily “mini-sorting” routine at end of shift to clean up and segregate waste				
Reuse suitable offcuts internally for accessories, linings, stuffing and sampling				
Track monthly quantities and value of each waste category (sold, stored, discarded)				
Conduct regular cutting-room efficiency checks (marker utilisation, fabric utilisation reports)				
Optimise lay length, ply height and fabric tension to reduce fabric losses				
Repair and reuse trolleys, bins and handling equipment instead of discarding				
Implement basic energy-saving measures (LED retrofits, switch-off protocols, compressed air leak repair)				
Implement basic energy-saving measures (LED retrofits, switch-off protocols, compressed air leak repair)				
Track monthly electricity and fuel consumption (kWh, litres, kg) per production line				
Introduce simple water-saving measures (leak repair, low-flow nozzles, reusing wash water where feasible)				
Segregate hazardous and chemical waste (sludge, oily rags, chemical containers) and store safely				
Establish agreements with formal recyclers for regular sale of sorted, quality-controlled textile & other waste streams				
Pilot one mechanical recycling pathway for a selected waste stream (e.g. knit clips to OE yarn / felt)				
Maintain a log of waste-related incidents (fires, spillages, unsafe handling) and corrective actions				

Table 3 → Packaging

Practical Actions	Personnel	Cost	Timeline	Support
Map all current primary, secondary and tertiary packaging materials used				
Eliminate unnecessary packaging layers (e.g. double polybags, redundant inner boxes)				
Shift from mixed-material packaging (laminated or foil-lined) to mono-material where possible				
Optimise carton sizes to better match product volume and reduce void fill				
Introduce standardized carton and pallet patterns to improve loading and reduce damage				
Replace virgin plastic polybags with recycled-content or certified recyclable options				
Explore reusable packaging solutions for local or intra-cluster shipments				
Reduce ink coverage and avoid metallic / PVC-based inks on cartons and labels				
Consolidate shipments to reduce partial loads and excess packaging				
Work with key buyers to agree simplified, more circular packaging requirements				
Introduce clear labelling on packaging to indicate recyclability and material type				
Record packaging material usage per order or per month to identify hotspots				
Partner with packaging suppliers to co-develop lower-impact solutions (thinner boards, innovative fillers)				

Table 4 → Workers' Wellbeing & Skills (Social Inclusion)

Practical Actions	Personnel	Cost	Timeline	Support
Provide appropriate PPE to workers handling waste, dust, chemicals and noisy machinery				
Ensure safe drinking water, clean toilets (including separate toilets for women), and adequate rest breaks				
Display key policies (working hours, overtime, wages, grievance channels) in local language in visible places				
Issue written appointment letters and payslips to all workers, including helpers and sorters				
Conduct regular safety training (machine guarding, chemical handling, fire safety, ergonomics)				
Set up or strengthen an Internal Complaints Committee (ICC) and communicate its role to all workers				
Introduce a simple grievance mechanism (complaint box, regular listening sessions)				
Offer basic health camps or linkages to government health schemes for workers				
Provide gender-sensitive facilities (changing area, safe transport timings where relevant)				
Facilitate opening of bank accounts for all workers and shift towards digital wage payments				
Offer basic financial literacy and social security orientation sessions				
Identify opportunities to formalise key informal roles (e.g. long-term sorters, loaders) with clearer terms and safety				
Provide upskilling opportunities (multi-skill training, circular practices, quality control)				
Encourage women workers to take on lead or supervisory roles in selected departments				
Involve worker representatives when planning major process or layout changes				

Table 5 → Compliance & Regulatory Readiness

Practical Actions	Personnel	Cost	Timeline	Support
List all applicable labour, environment, safety and MSME regulations for the unit				
Ensure registrations and licences are current (factory licence, pollution consents, labour registrations, etc.)				
Develop a simple compliance calendar with key dates (renewals, inspections, filings)				
Maintain proper documentation for wages, working hours, overtime and leave				
Verify that no workers below legal minimum working age are employed in any operation				
Maintain chemical inventory and Material Safety Data Sheets (MSDS) for all significant chemicals				
Keep records of effluent treatment operations, sludge disposal and related testing (where applicable)				
Maintain records of waste disposal / sale to authorised recyclers or processors				
Conduct a basic internal audit once a year for labour and environmental compliance				
Identify and address critical non-compliance risks (e.g. blocked exits, missing fire extinguishers)				
Undertake a gap assessment for relevant certifications (ZED, ISO, GRS, etc.)				
Prepare a simple compliance dossier that can be shared with buyers and scheme authorities when needed				

Table 6 → Traceability & Digital Product Passport (DPP)

Practical Actions	Personnel	Cost	Timeline	Support
Map current information flows: what data is captured at raw material, production, and dispatch stages				
Create a basic supplier register with details on fibre type, certifications, and locations				
Introduce batch IDs for each lot of raw material (including recycled inputs)				
Link batch IDs to production orders and finished goods through simple production logs				
Develop a simple Excel or paper-based “Traceability Log” for selected product lines				
Record key attributes needed for future DPP requirements (e.g. fibre composition, country of origin, recycled content)				
Pilot QR codes or barcodes on cartons or product labels for 1–2 product lines				
Store basic documentation (test reports, certificates, purchase orders) in an organised way for quick retrieval				
Work with key buyers to understand their specific traceability and DPP expectations				
Engage digital solution providers or cluster programmes to explore low-cost traceability tools				
Train relevant staff on recording and maintaining accurate traceability data				

Table 7 → Collaborations & Partnerships

Practical Actions	Personnel	Cost	Timeline	Support
Join relevant industry associations, cluster platforms or producer groups				
Participate in cluster-level RE-CE programmes, trainings and pilot projects				
Build partnerships with local recyclers for regular sale or purchase of recycled fibres and yarns				
Collaborate with SHGs, women's groups or social enterprises for sorting, upcycling or finishing activities				
Engage with technical institutes or training providers for upskilling workers				
Partner with NGOs or waste picker organisations to improve feedstock quality and worker conditions in informal chain				
Coordinate with neighbouring MSMEs for joint waste aggregation and logistics				
Explore shared investments in common facilities (sorting hubs, Textile Recycling Facilities (TRFs), Effluent Treatment Plants (ETPs), testing labs)				
Engage with banks, SIDBI and other financial institutions to understand RE-CE finance options				
Work with government departments to access schemes such as GIFT, SPICE, ZED or state-level incentives				
Co-create pilot circular products with buyers (e.g. limited runs using recycled content or upcycled materials)				

Table 8 → Circular Supply Chain Transition

Practical Actions	Personnel	Cost	Timeline	Support
Map your supply chain from Tier 1 to key Tier 2 suppliers (spinners, processors, recyclers, trim suppliers)				
Identify which existing products are most suitable for introducing recycled content or circular design				
Pilot one circular product line (e.g. recycled yarn fabric, upcycled collection, take-back-based product) with a willing buyer				
Develop specifications and quality standards for recycled-content products in collaboration with spinners and buyers				
Aggregate waste volumes with other MSMEs to support a shared mechanical recycling line or textile recovery facility				
Establish clear feedstock quality agreements with aggregators and recyclers (moisture, contamination, shade, elastane levels)				
Monitor and record volumes of circular products (kg, pieces, revenue) alongside conventional products				
Gradually increase recycled content in selected yarns/fabrics based on process learning and market acceptance				
Explore use of post-consumer textile waste in nonwoven/felt products, starting with tightly controlled pilot streams				
Use scheme support (e.g. GIFT/SPICE) to co-finance key CAPEX for circular processes (sorting lines, recycling machines, traceability)				
Share learning and results with cluster peers to build confidence and demand for circular products				

Compiling Your Circular Action Plan

Step 1 – Select Your Priority Actions

From all the filled tables:

1. Go through each focus area and mark:

- ✓ Actions that are essential (legal/safety risk, major waste, key buyer requirement)
- ★ Actions that are high-opportunity (good impact on cost, circularity, or market access)

2. On a separate sheet (or the master table below), list:

- 5–7 priority actions for the next 0–12 months
- 3–5 actions for the next 12–24 months

3. When in doubt, prioritise actions that:

- Reduce clear risk (safety, legal, reputational)
- Are low/medium cost but unlock visible benefits
- Build capability (systems, skills, traceability) that you can reuse later
- Can be supported by schemes, buyers or cluster platforms

Step 2 – Fill Your One-Page Circular Action Plan

Use the master table below to bring all priority actions into one place.

Tip:

- Keep the plan to one or two pages max.
- Use roles, not individual names (Owner, Production Manager, HR/Admin, etc.), so it stays valid even if people change.

Circular Action Plan – 0–24 Month Summary

Priority Action (what you will do)	Why this matters (1–2 lines)	Responsible Role (who leads)	Cost (Low/Med/High)	Timeline (Short 0–6 m / Medium 6–12 m / Long 12–24 m)	Support Needed (training / scheme / buyer / cluster)	C-SELF Notes (social & labour aspects)	Status (Not started / In progress / Done)
---------------------------------------	------------------------------	------------------------------	---------------------	---	--	--	---

Step 3 – Agree How You’ll Review the Plan

To make sure the plan doesn’t just sit on a shelf:

1. Choose a review rhythm

- Quick check every 3 months (e.g. at the end of each quarter)
- Deeper review once a year to update actions and scores

2. During each review, update:

- Status column (Not started / In progress / Done)
- Any changes in timelines or support needed
- 2–3 simple numbers you can track, for example-
 - % of waste segregated at source
 - kg of waste sold to formal recyclers per month
 - number of workers trained (men/women)
 - number of circular product lines running

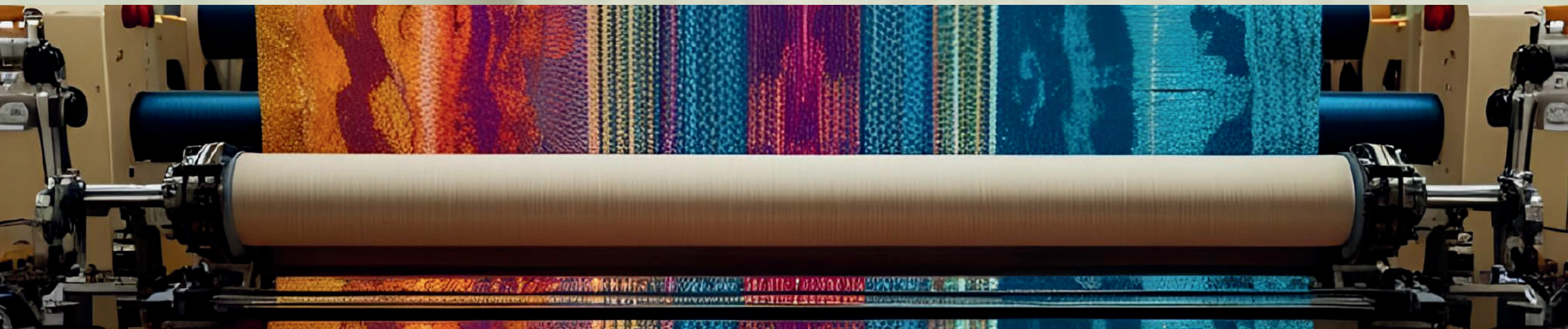
3. Keep a small folder (physical or digital) for:

- This Circular Action Plan
- Photos, attendance sheets, bills, and basic data
- Any scheme/buyer communication related to these actions

From Guidebook to Practice

- Start with a few priority actions – not everything at once.
- Build your Circular Action Plan with your team and partners.
- Use schemes, cluster support and the C-SELF lens to make it fair and future-ready.

**Circularity isn't a one-time project – it's how we can
run the factory, every day.**



FACTSHEET FOR TEXTILE SECTOR RE-CE APPROACH

2. FACTSHEET FOR TEXTILE SECTOR RE-CE APPROACH

2.1. Understanding RE-CE in Textiles	39
2.2. Textile Sector RE-CE Approaches	46
2.3. Sorting Post-Consumer Textile Waste	75
2.4. Deep Dive into Textile Waste Recycling	94
2.5. Circular Transition for MSME Sector	132
2.6. Traceability & Digital Product Passport	155
2.7. Social Inclusion	172
2.8. Environmental and Regulatory Compliances	206
2.9. Monitoring, Evaluation, & Certifications	215



Understanding RE-CE in Textiles

2.1 UNDERSTANDING RE-CE IN TEXTILES

2.1.1. What is Resource Efficiency (RE).....	40
2.1.2. What is Circular Economy.....	41
2.1.3. RE-CE for Textile MSMEs.....	42
2.1.4. Reflections from the Ground.....	43
2.1.5. Additional Readings and Resources.....	44

2.1.1 WHAT IS RESOURCE EFFICIENCY (RE)

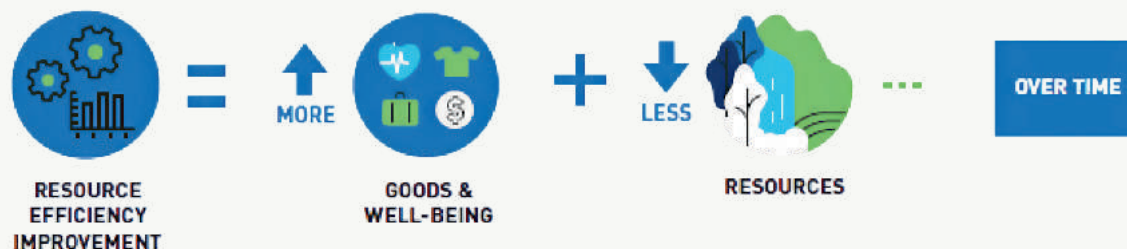
Understanding Resource Efficiency: Doing More with Less

Resource efficiency means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows us to create more with less and to deliver greater value with less input.

By UNEP IRP, Decoupling Natural Resource Use and Environmental Impacts from Economic Growth (2011)

Resource efficiency means using the Earth's limited resources in a sustainable manner, to reduce environmental impacts while delivering wellbeing and economic growth.

By European Commission, EU Green Deal and Resource Efficiency Roadmap



Source: [UN SDG Helpdesk](#)

Additionally, the National Resource Efficiency Policy (Draft, 2019), laid the groundwork for mainstreaming circular economy principles in India. The draft policy emphasises sustainable resource use, waste minimisation, and lifecycle thinking across key sectors including textiles, construction, and plastics, aligning national efforts with the EU's circular transition framework.

2.1.2 WHAT IS CIRCULAR ECONOMY (RE)

Understanding Circular Economy: Closing the loop

A circular economy is a system where materials are kept in use for as long as possible by redesigning, reusing, repairing, and recycling them.

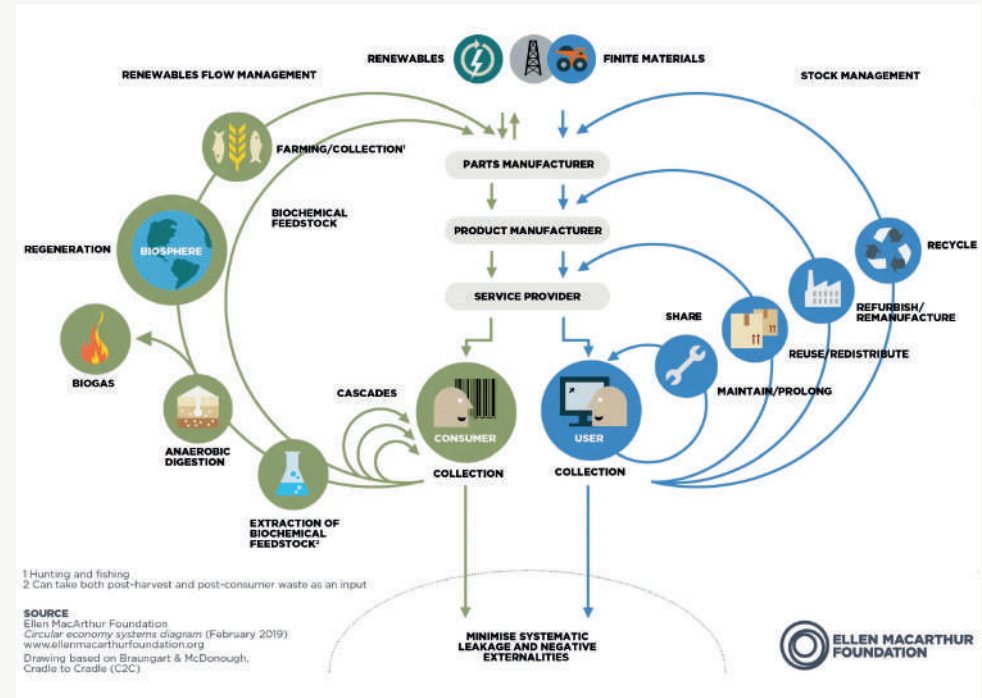
By Ellen MacArther Foundation (2011)

A circular economy is where the value of products, materials, and resources is maintained in the economy for as long as possible, and the generation of waste is minimised.

By European Commission, Closing the Loop – EU Circular Economy Action Plan (2015)

Circular economy promotes sustainable production and consumption by extending product life, recovering waste, and minimizing environmental impact.

By NITI Aayog, Circular Economy report (2021)



2.1.3 RE-CE FOR TEXTILE MSMES

Why RE-CE Matters for Textile MSMEs

Cut Costs, Save Resources

Efficient cutting layouts, low-liquor dyeing, and improved boilers cut fabric, water, and energy use by 10–40%, saving lakhs annually.

Reduce Raw Material Dependence

Recycling cotton/polyester blends and reusing in-house materials lowers reliance on virgin raw materials by 20–25%.

Minimise Waste

Reduce cutting waste, dye sludge, and off-spec outputs; turn scraps into new products like laptop sleeves to create revenue.

Meet Buyer Demands

Data on GHG emissions and circular sourcing helps MSMEs secure export orders and align with global buyers.

Access Green Finance & Certifications

Upgrades in energy/resource efficiency open doors to SIDBI GIFT, SPICE schemes, certifications, and sustainability-linked finance.

Cleaner Operations, Stronger Brand

Adopting circular business models (repair, resale, rental) builds a green brand image, strengthens competitiveness, and attracts new customers.

Using CAD/marker-based cutting improves fabric yield by 10–15%⁷, saving ₹2–3 lakh annually for a medium-sized unit.

Switching to a condensing boiler improves fuel use by 10–12%⁸, saving up to ₹4–5 lakh annually in coal/biomass costs for a typical dyeing unit.

Reduce water & chemical consumption by 30–40%⁹, cutting effluent treatment costs by ₹1.5–2 lakh per year.

7. International Trade Centre: *Good Practices in the Global Apparel Industry* (2022).

8. Energy Star: *Energy Efficiency Improvement Opportunities for the Textile Industry* (2010).

9. United Nations Industrial Development Organization: *RECP Manual Textile Sector* (2021).

2.1.4 REFLECTIONS FROM THE GROUND

Clusters thought on RE & CE

- 1 Awareness vs. Action Gap:** Many MSMEs are aware of key terminologies related to sustainability (zero-waste, circularity, EU compliance) but lack clarity on practical steps.
- 2 Cost Concerns Dominate:** Units see RE & CE as cost-heavy investments (energy-efficient machinery, ZLD, certifications).
- 3 Export-Driven Push:** Export-oriented units (esp. Tiruppur) are more proactive, since buyers demand compliance (traceability, GRS, GOTS). Domestic market units often feel less pressure to adapt, citing lack of local consumer demand for sustainable textiles.
- 4 Informal Sector Blind Spot:** Informal recyclers, sorters, and women home-workers feel excluded from sustainability conversations.
- 5 Skills & Technology Gaps:** Clusters highlight the need for skilling programs (repair, upcycling, eco-friendly dyeing) and affordable technologies.

2.1.5 ADDITIONAL READINGS AND RESOURCES

Ellen MacArthur Foundation Circular Economy Introduction → <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>

Ministry of External Affairs EU-India Joint Declaration on RE-CE → https://www.mea.gov.in/bilateral-documents?dtl/32829/EUIndia_Joint_Declaration_on_Resource_Efficiency_and_Circular_Economy#:~:text=The%20objectives%20of%20this%20Joint,academia%20and%20research%20institutes

MoEFCC Draft National Resource Efficient Policy 2019 → <https://ic-ce.com/wp-content/uploads/2020/10/Draft-National-Resourc.pdf#:~:text=National%20Resource%20Efficiency%20Policy%2C%202019,climate%20change%2C%20cumulative%20energy%20demand>

EU-India Resource Efficiency and Circular Economy Initiative Toolkit → <https://eu-rei.com/textile-toolkits/>

Ellen Macarthur Foundation What is a Circular Economy? → <https://www.ellenmacarthurfoundation.org/topics/circular-economyintroduction/overview#:~:text=The%20circular%20economy%20is%20a,the%20consumption%20of%20finite%20resources>

Ellen MacArthur Foundation A New Textiles Economy (2017) → <https://www.ellenmacarthurfoundation.org/a-new-textiles-economy>



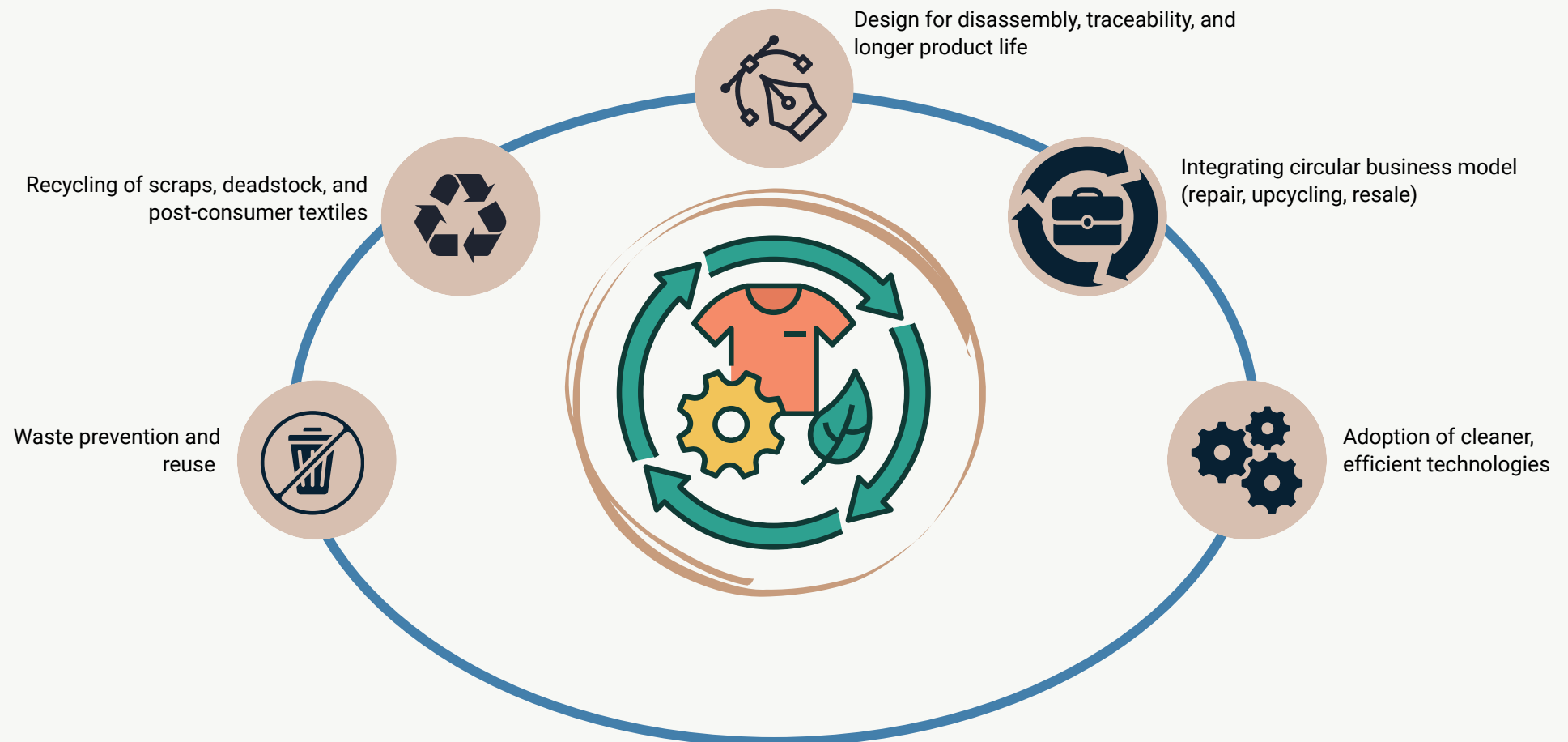
2.2 Textile Sector RE-CE Approaches

2.2 TEXTILE SECTOR RE-CE APPROACHES

- 2.2.1. What are Textile RE-CE Approaches?47
- 2.2.2. Strategies for Textile RE-CE Approaches48
- 2.2.3. Opportunities for MSMEs using R Strategies62
- 2.2.4. Reflections from the Ground.....64
- 2.2.5. Case Studies65

2.2.1 WHAT ARE TEXTILE RE-CE APPROACHES?

Textile RE-CE approaches are strategies and actions that help reduce resource use, eliminate waste, and keep materials in use, across the textile product lifecycle.

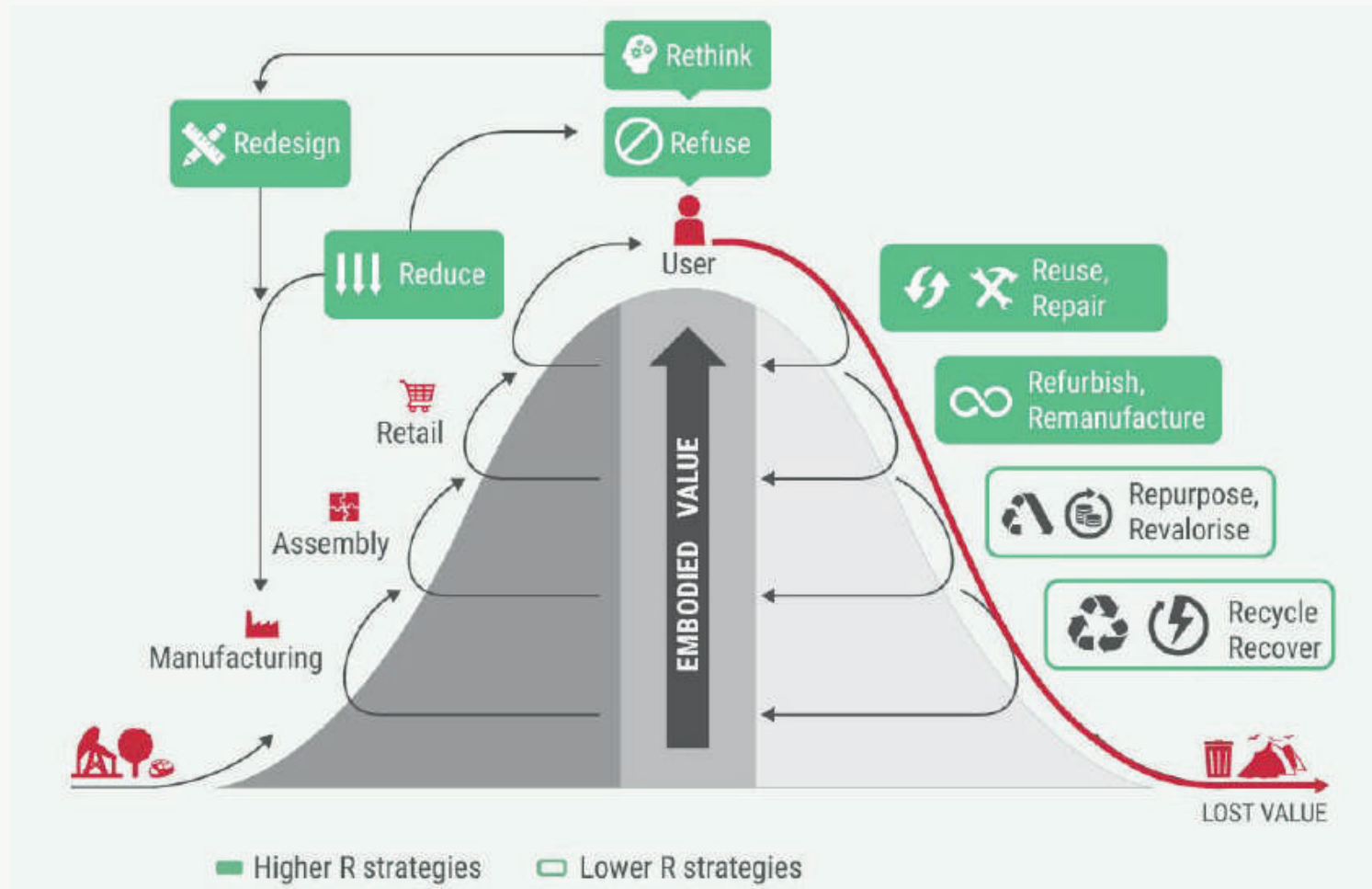


2.2.2 STRATEGIES FOR TEXTILE RE-CE APPROACHES

Circular Economy		Strategies	Description	Examples
	Smarter Product Use and Manufacture	R0 Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product	Refuse single-use plastic packaging for garments
		R1 Rethink	Make product use more intensive (e.g. by sharing product)	Event wears rental/shared service instead of individual purchase
	Extend Lifespan of Product and its Parts	R2 Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials	Second-hand clothing resale e-commerce platforms
		R3 Reuse	Reuse by another consumer of discarded product which is still in good condition and fulfils its original function	CAD marker planning reduces fabric waste by 15–20%
		R4 Repair	Repair and maintenance of defective product so it can be used with its original function	Stitching/patching torn jeans instead of discarding
		R5 Refurbish	Restore an old product and bring it up to date	Refurbishing hotel linens into new household textiles
		R6 Remanufacture	Use parts of discarded product in a new product with the same function	Remanufacturing zippers/buttons into new garments
	R7 Repurpose	Use discarded product or its parts in a new product with a different function	Scrap denim made into laptop sleeves or bags	
	Useful application of materials	R8 Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality	Mechanical recycling of cotton/polyester into yarn
		R9 Recover	Incineration of material with energy recovery	Waste polyester incinerated in cement kilns for fuel
Linear Economy				

Adapted from Kirchherr, J. , & Piscicelli, L. (2019). Towards an Education for the Circular Economy (ECE) : Five teaching principles and a case study. *Resources, Conservation and Recycling*, , 150, 104406. <https://doi.org/10.1016/j.resconrec.2019.104406>

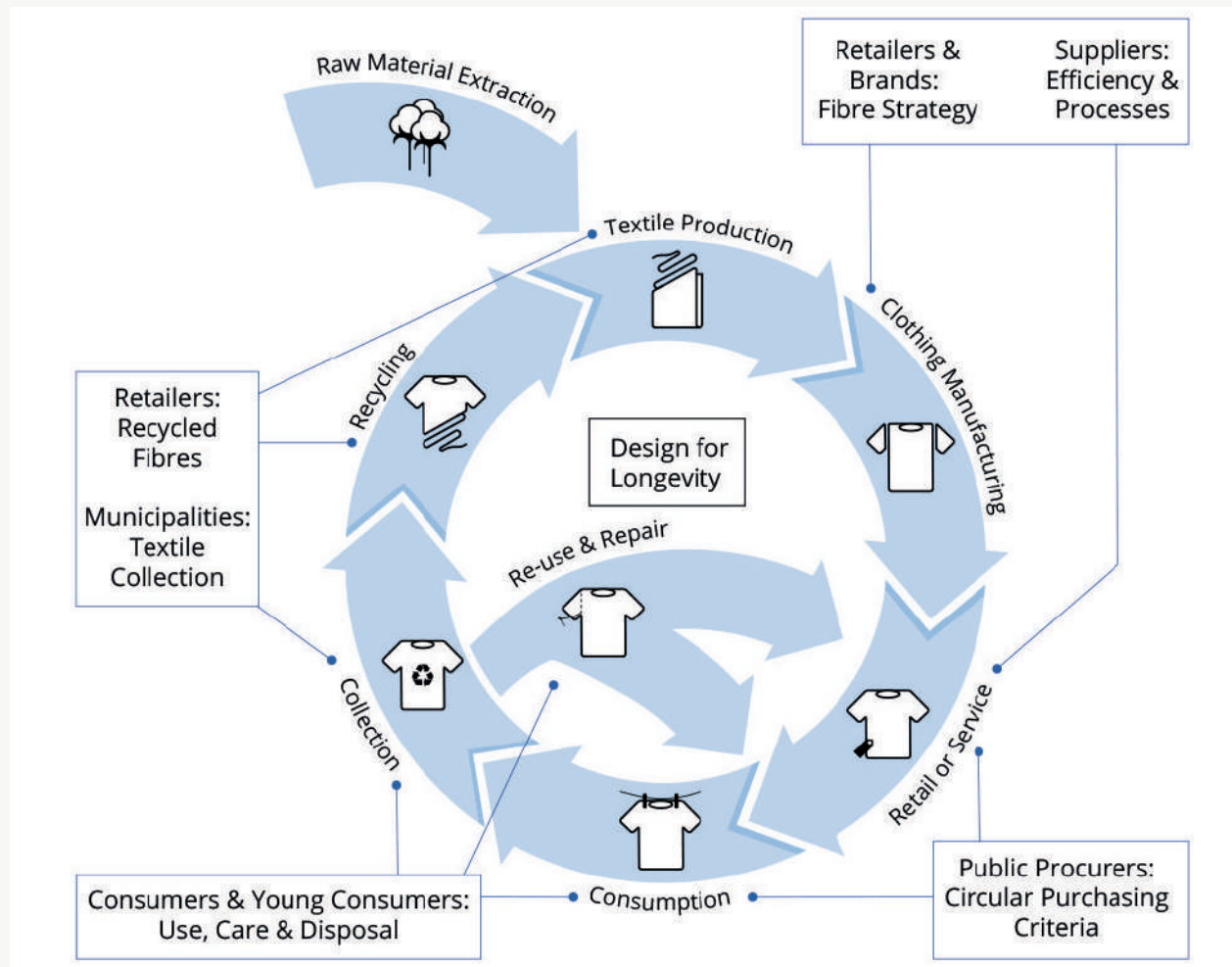
Circular Strategy and Value Generation



Source: Adapted Circular Value Hill Model (Metabol ic, 2021)

Circular cycle of textiles

Ambitions and actions based on the principles of a circular economy to design out negative impacts and capture the economic opportunity by truly transforming the way textiles, clothes, and garments are designed, sold, and used.



Ellen MacArthur Foundation (2017). A new textiles economy: Redesigning fashion's future

R0: Refuse (Avoiding Unsustainable Products and Processes)

Refuse is about eliminating waste at the source by avoiding unsustainable materials, rejecting overproduction, and refusing harmful inputs or partnerships that don't align with circular economy principles.



Avoid Unnecessary Purchases

Buy fabrics, trims, dyes, or machinery only when essential — avoid overstocking raw materials that may become waste



Avoid Hazardous Materials

Reduce use of toxic dyes, azo chemicals, and harmful finishing agents; choose certified safer alternatives to protect workers and the environment



Avoid Excessive Packaging

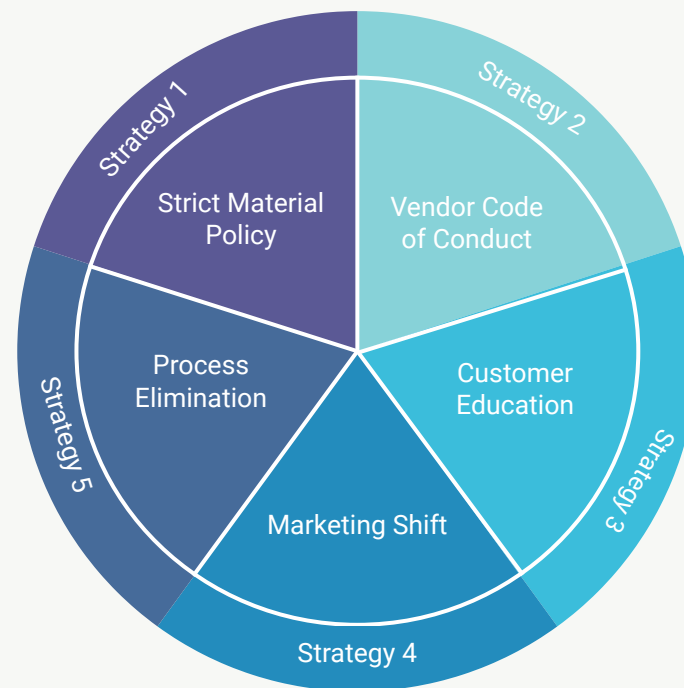
Minimize plastic/polybags and single-use cartons in transport and storage; use reusable crates or fabric wraps where possible



Avoid Single-Use Products

Phase out disposable PPE, plastic sheets, and poly-sleeves in garment handling; shift to washable, durable alternatives

Image Source: AI generated

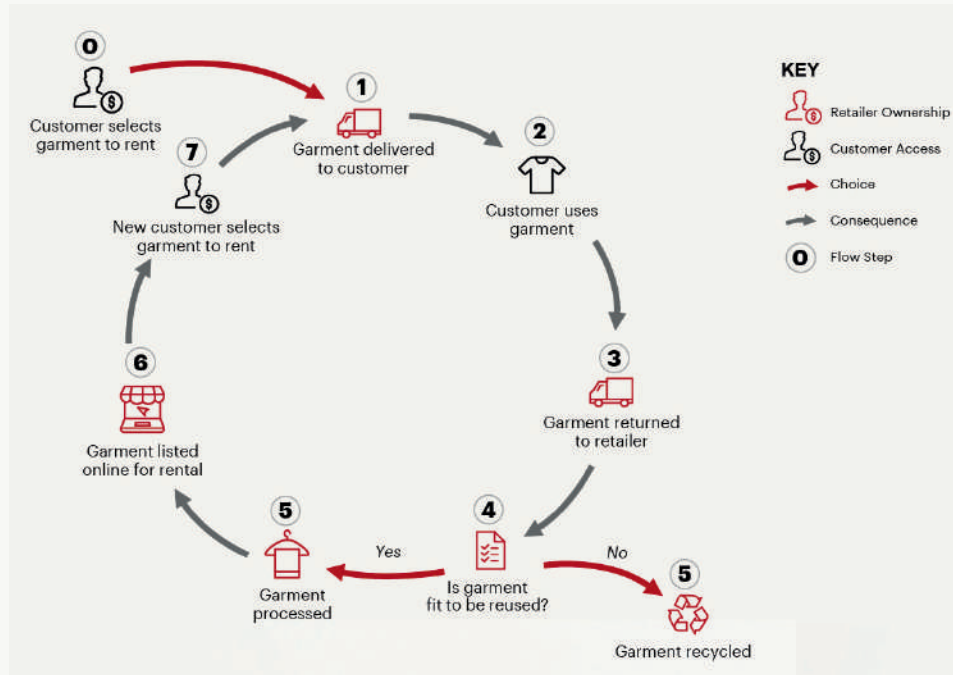


'Refuse' Strategies

Source: Adapted from Conserve India

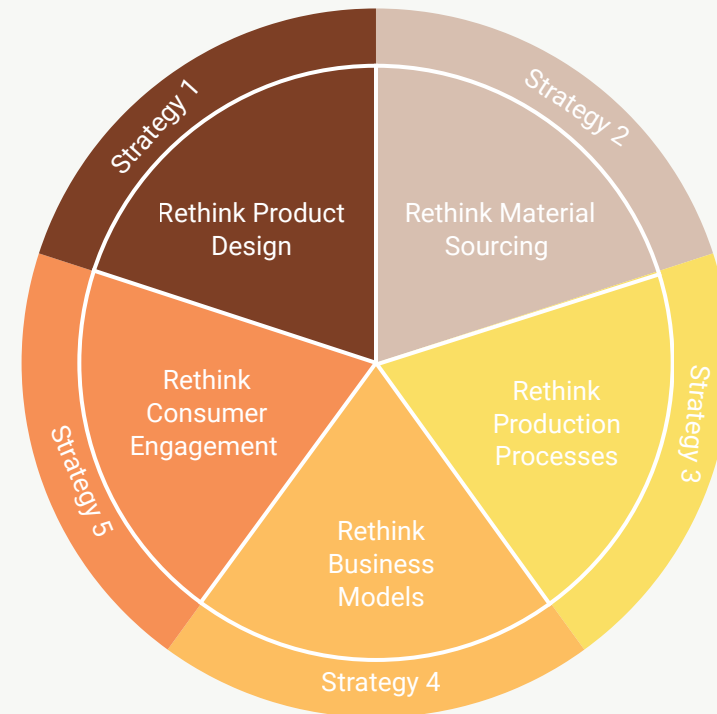
R1: Rethink (Redesigning Systems for Circular Value Creation)

Rethinking means to redesign products, processes, partnerships, and customer relationships so that waste is prevented, materials keep circulating, and value is retained for as long as possible.



A visual representation of Garment Flow in Rental model

Fashion for Good, The Future Of Circular Fashion - Assessing the Viability of Circular Business Models (2019)



'Rethink' / 'Redesign' Strategies

Image Source: Conserve India

R2: Reduce (Cutting waste and resource use at source)

Reduce means minimising material, water, energy, and chemical use before waste is even created. It focuses on smarter design, production efficiency, and demand planning to prevent overproduction and resource wastage.

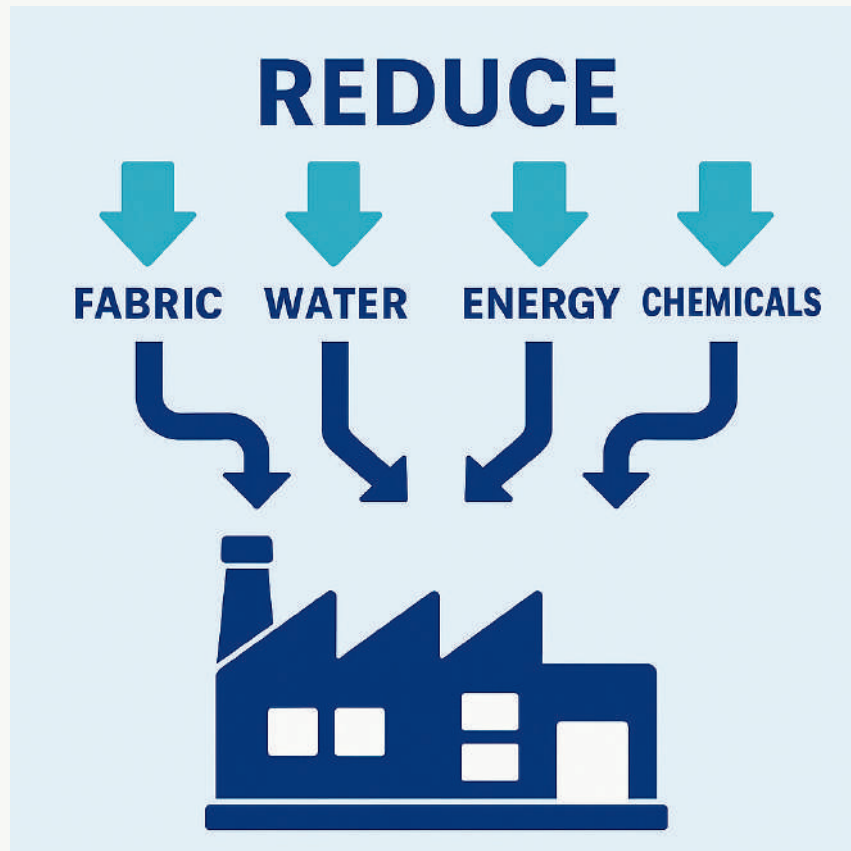
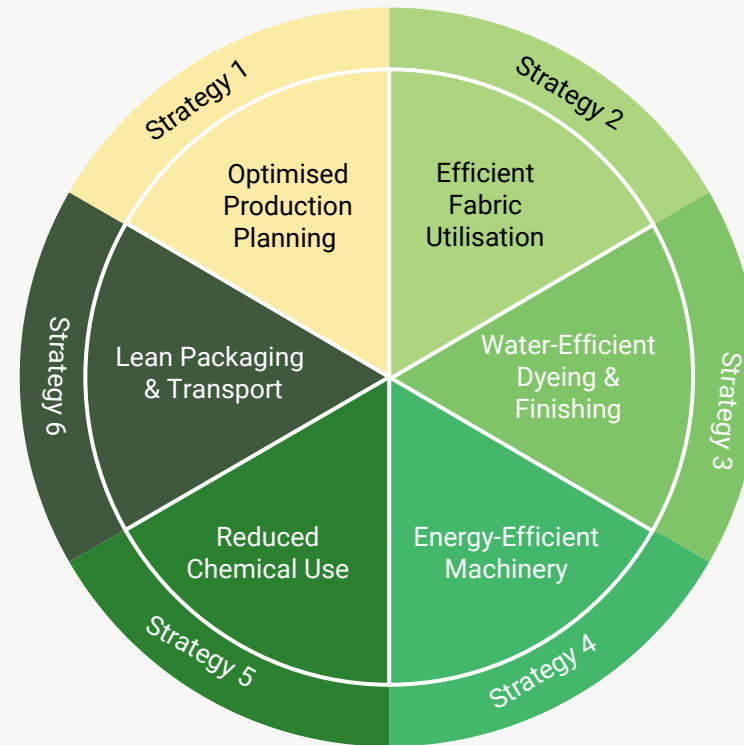


Image Source: AI generated

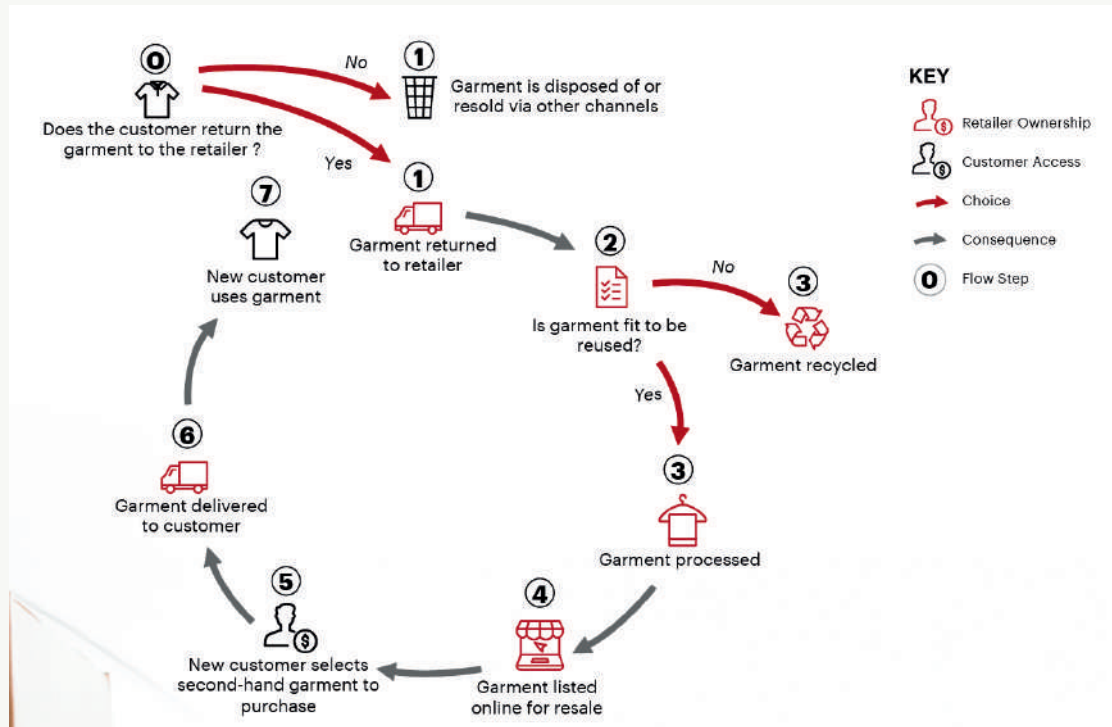


'Reduce' Strategies

Image Source: Conserve India

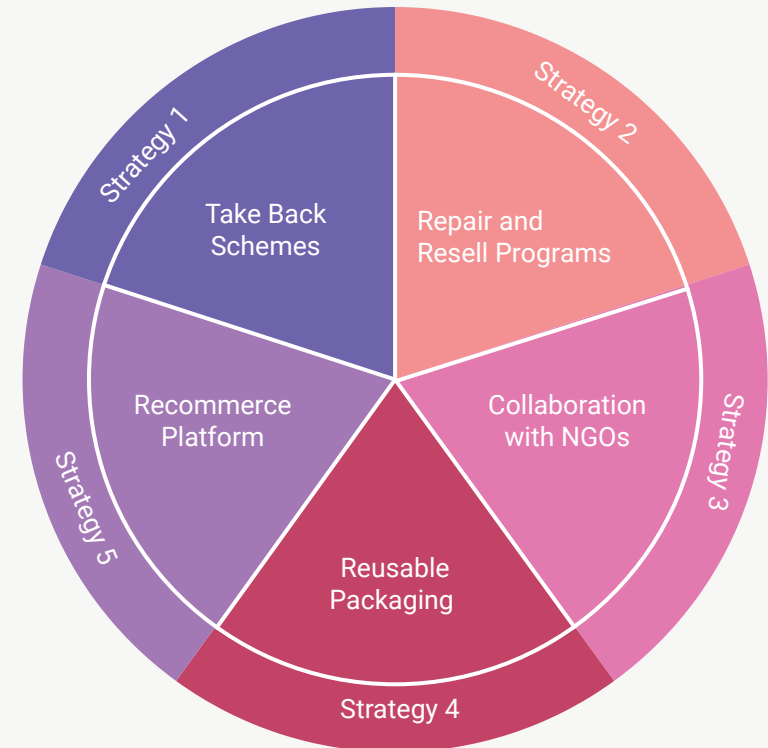
R3: Reuse (Extending the Product/Material Life by Repeated Use)

For MSMEs, Reuse means finding ways to use garments, fabric, or components again without major reprocessing. This could be within your own production process, sold as second-hand, or repurposed for different uses.



A visual representation garment flow of the Recommerce model

Fashion for Good, The Future Of Circular Fashion - Assessing the Viability of Circular Business Models (2019), [Read More](#)

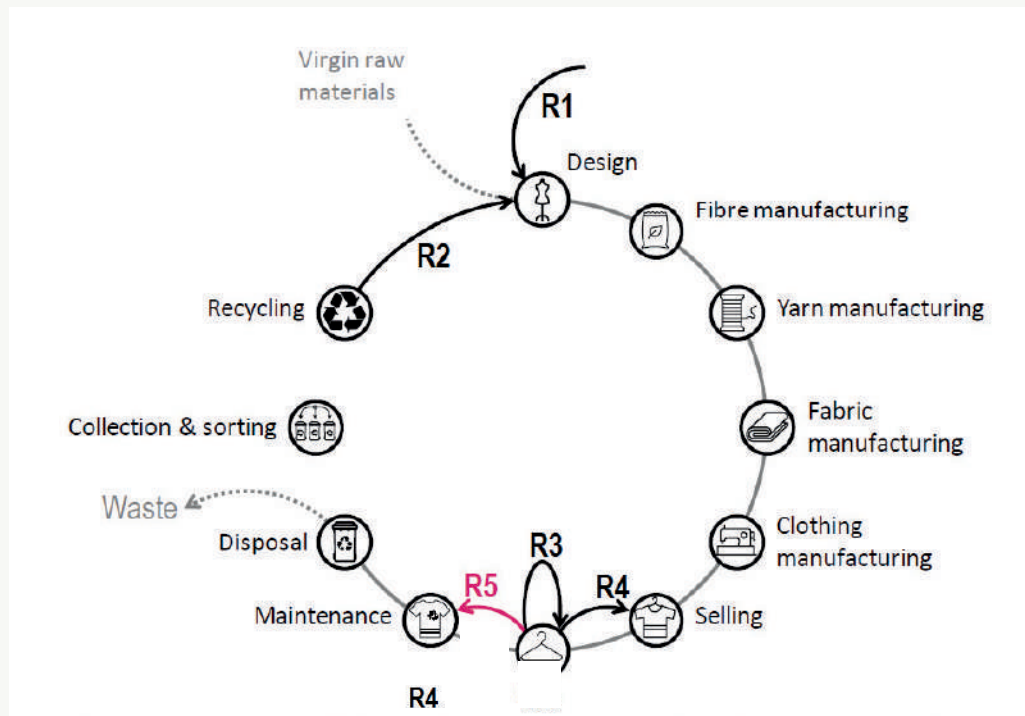


'Reuse' Strategies

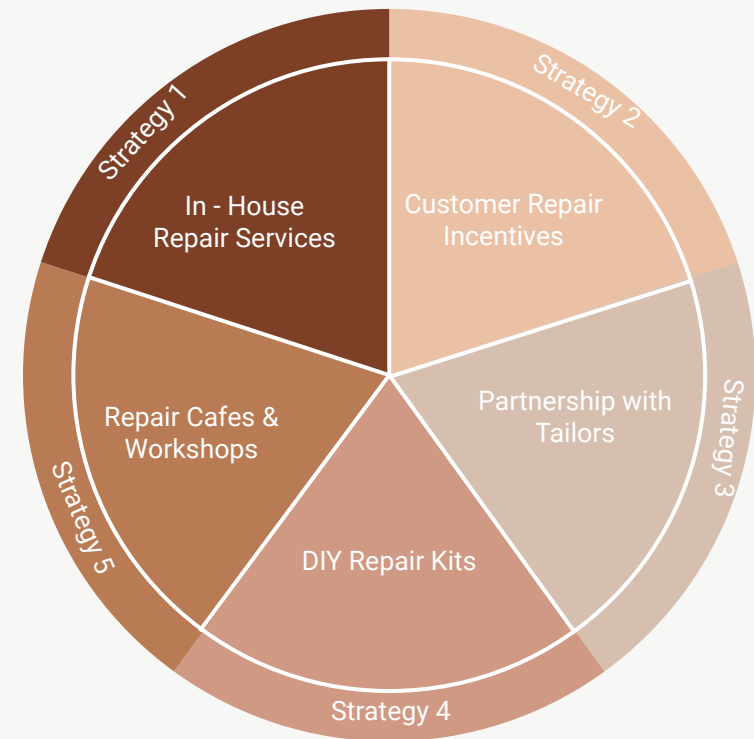
Image Source: Conserve India

R4: Repair (Restoring to Extend Product Life)

Repair involves fixing in-house quality rejects and post-consumer returns so they can be used again, instead of being discarded or downcycled. This is popular in India, the frugal component of Indian households.



Suarez-Visbal, Stuckrath, & Rosales Carreón. (2023). Circular Economy: An overview of global trends, challenges, and opportunities. In *Accelerating Sustainability in the Fashion, Apparel & Textiles*. Manuscript submitted for publication.

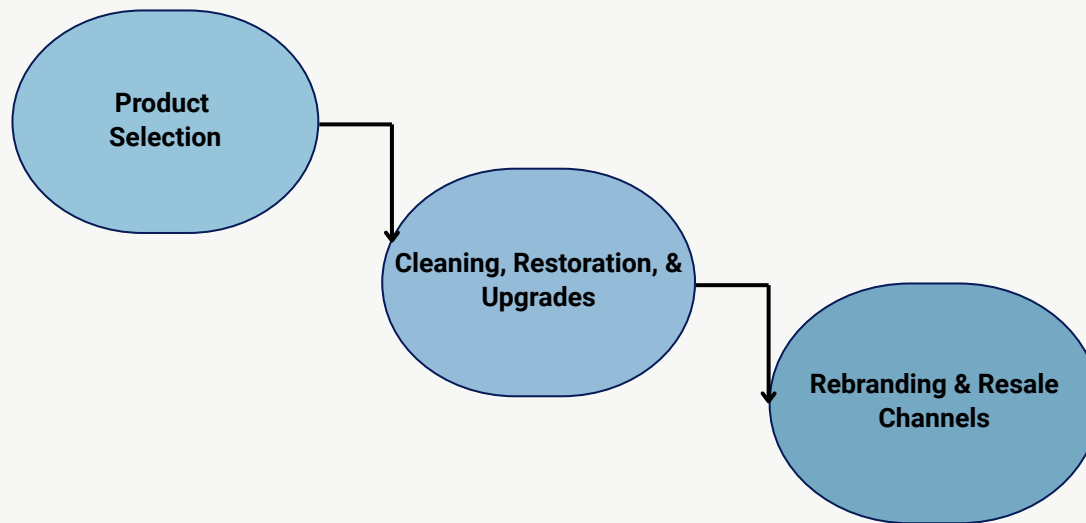


Repair Strategies

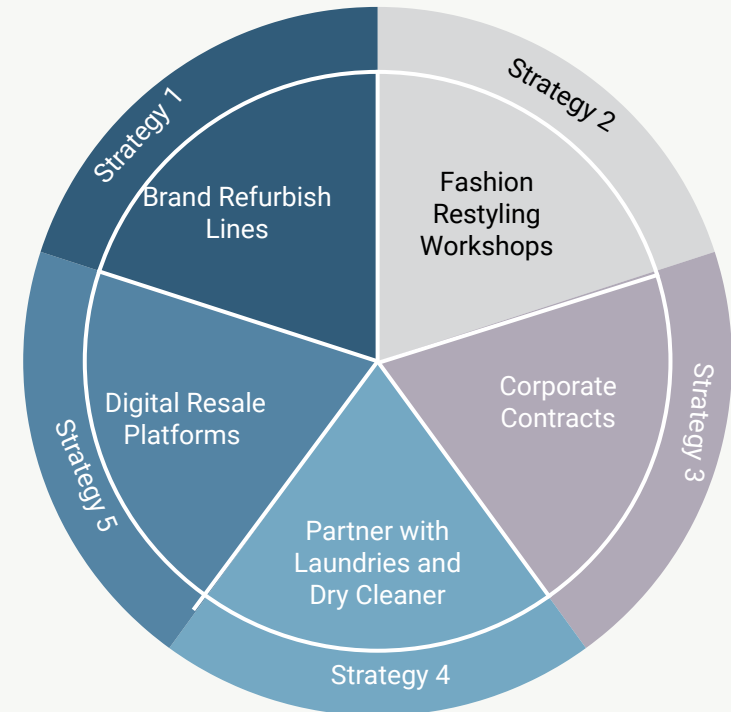
Image Source: Conserve India

R5: Refurbish (Restoration to “As-Good-As-New” Condition)

Refurbish goes beyond simple repair, it involves upgrading, reconditioning, or restyling a product to improve its value, appearance, or functionality before putting it back into the market.



'Refurbish' Roadmap for MSMEs



'Refurbish' Strategies

Image Source: Conserve India

R6: Remanufacture (Restoring Products for Second Life)

Remanufacture means recovering valuable parts from used or defective textile products, refurbishing or re-engineering them to meet original quality standards, and re-introducing them into production. It bridges repair and recycling, conserving material, energy, and labour already embedded in the product.

Some of the examples include extracting zippers, buttons, and labels from discarded garments for reuse in new production, retaining intact fabric portions from rejected garments and re-stitching into smaller products (aprons, kidswear).

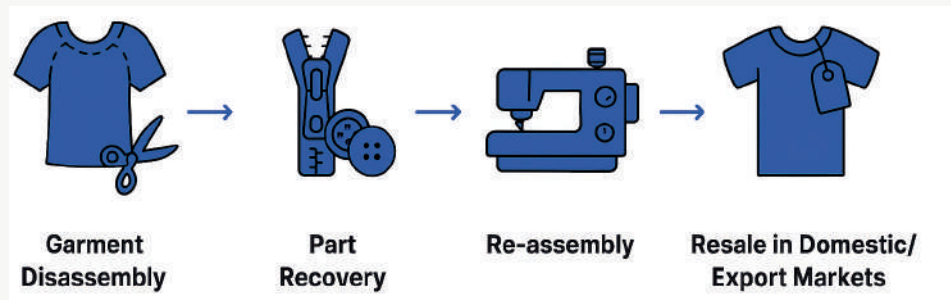
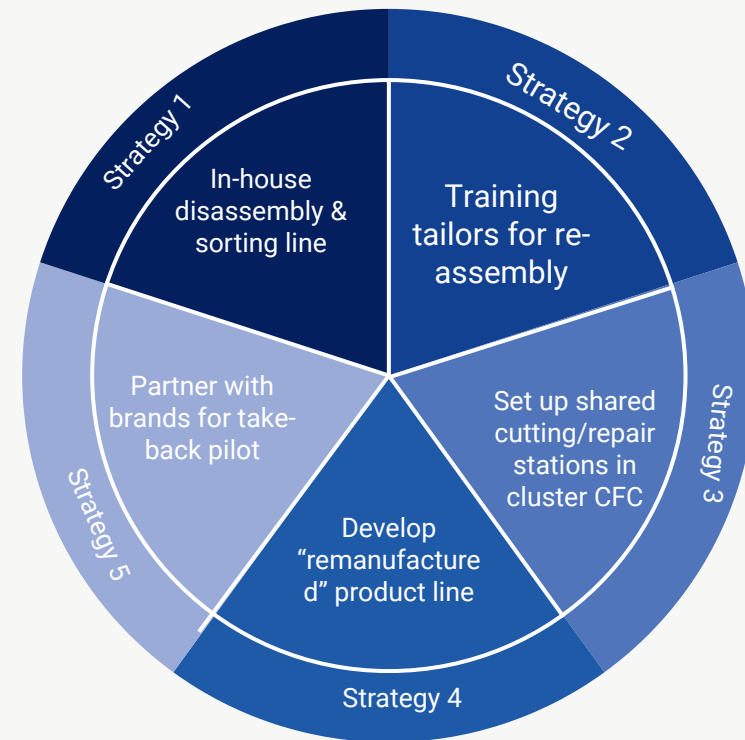


Image Source: AI Generated
Re-manufacturing Process



'Remanufacture' Strategies

Image Source: Conserve India

R7: Repurpose (Giving a New Use Without Major Processing)

Repurposing means taking an existing textile product or material and giving it a completely new function, often outside its original purpose, with minimal alteration.

Repurpose = Change the function with minimal processing
(e.g., old sari → curtain)



Image Source: South India Fashion



'Repurpose' Strategies

Image Source: Conserve India

Premium Repurposing: Upcycling (Creative Reuse for Higher Value)

Upcycling is the creative use of textile waste to make products of higher value or quality than the original material, focusing on design, craftsmanship, and storytelling. Unlike recycling, upcycling adds value through innovation.

Upcycle = Improve quality or desirability through creative transformation (e.g., old sari → designer dress)



Image Source: [Latasita](#)

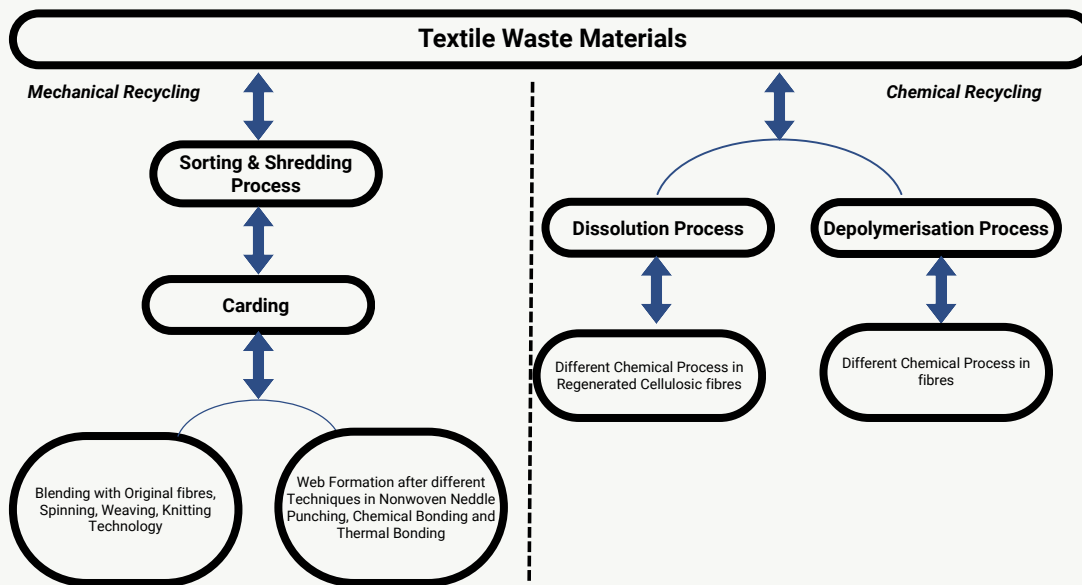


'Upcycling' Strategies

Image Source: [Conserve India](#)

R8: Recycle (Converting Waste Materials into New Raw Materials)

Recycling is the process of breaking down waste materials into their basic components so they can be processed into new raw materials for manufacturing, reducing the need for virgin resources.



Adapted from Guru et al (2025), Perspective Chapter: Functional Applications in Textile Reuse and Recycling -Enhancing Sustainability and Reducing Environmental Impact



'Recycling' Strategies

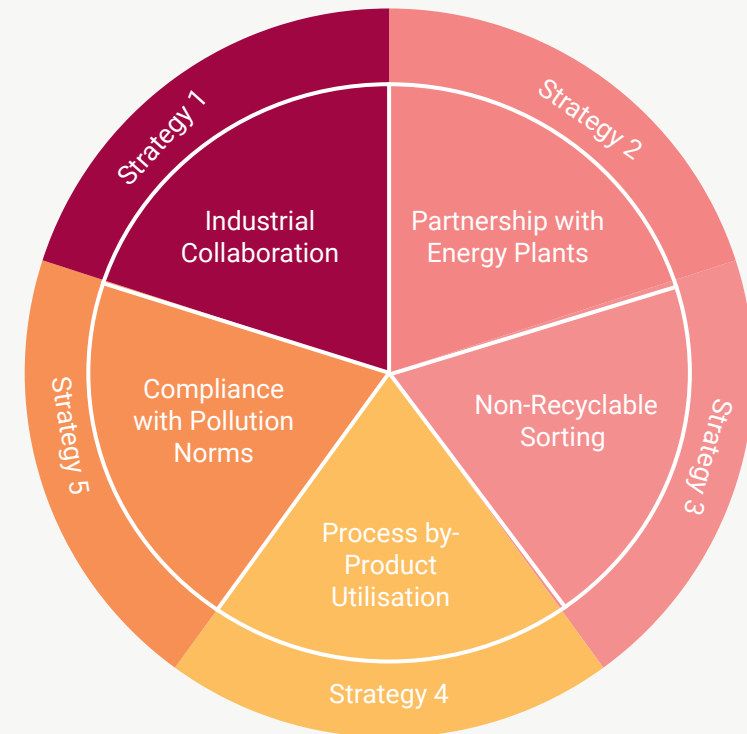
Image Source: Conserve India

R9: Recover (Extracting Value from Waste That Cannot Be Recycled)

Recovery focuses on maximising residual value from non-recyclable textile waste by converting it into energy, industrial inputs, or secondary raw materials. Recover is the final opportunity in the circular economy chain to extract value from waste that cannot be addressed by other R strategies.

Key Applications in Textiles

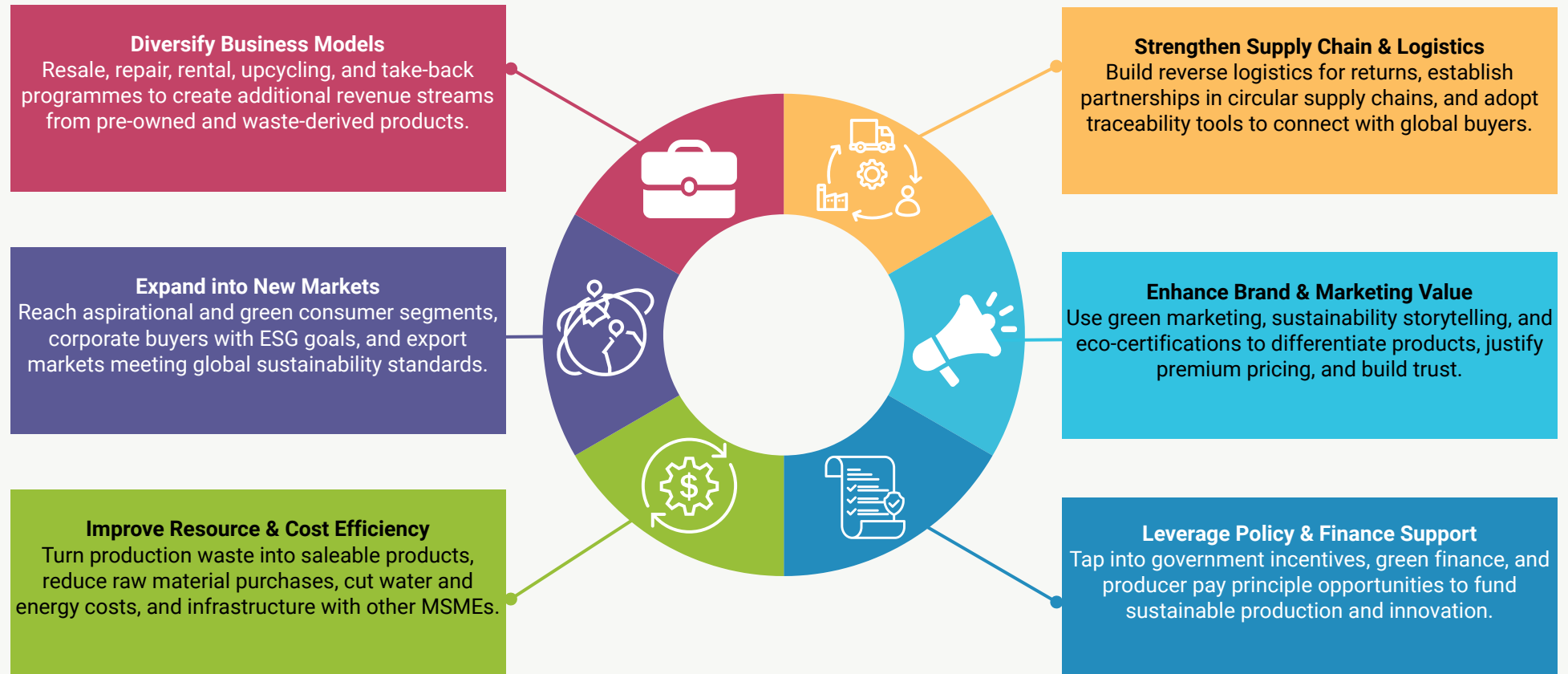
- **Energy Recovery** through waste-to-energy plants
- **Ash Material Recovery** from incineration residues
- **Co-Processing** alternative fuel in cement kilns
- **Chemical Recovery** to capture solvents, dyes, or chemicals



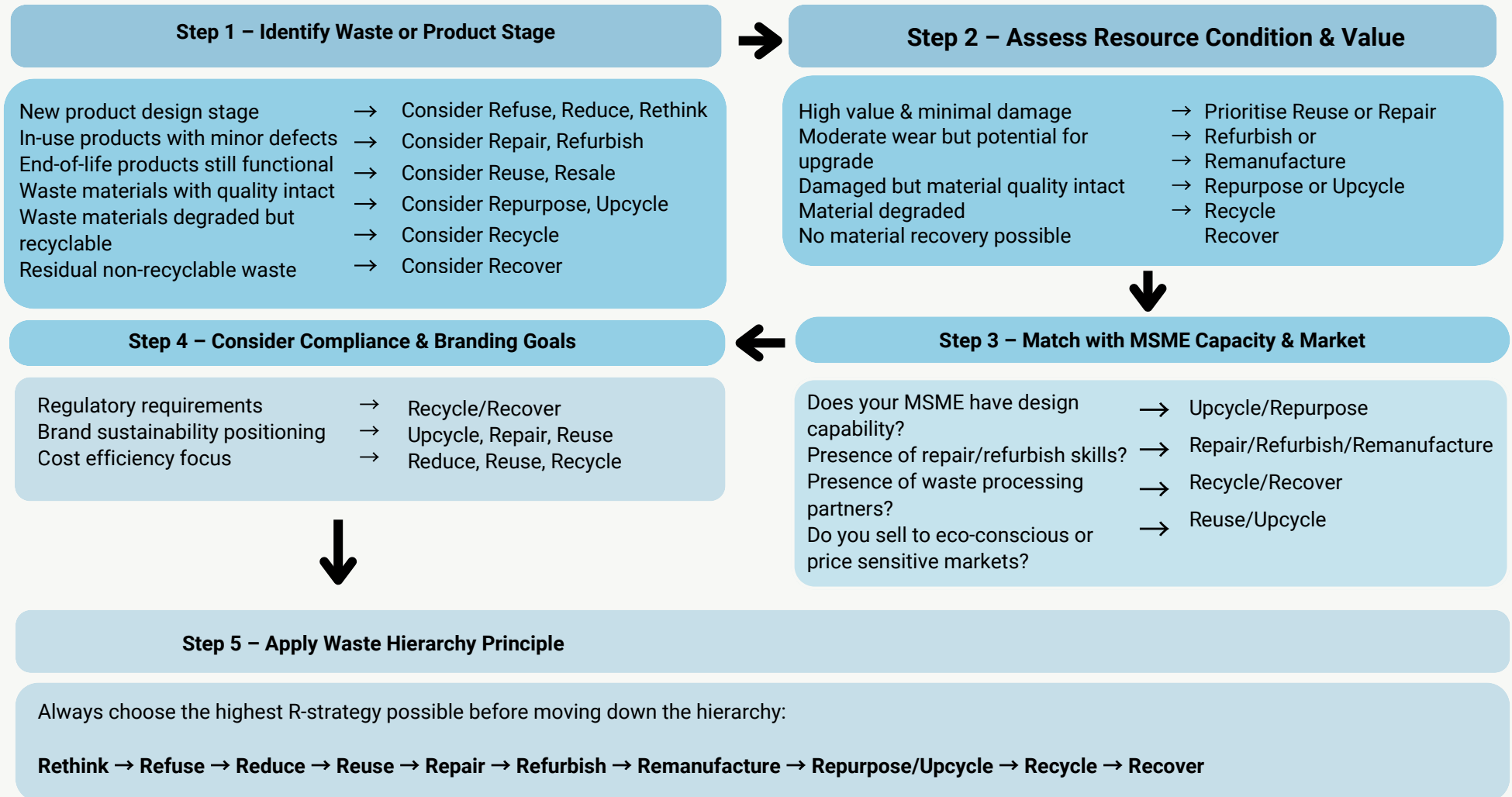
'Recover' Strategies

Image Source: Conserve India

2.2.3 OPPORTUNITIES FOR MSMEs USING R STRATEGIES



R-Strategy Selection Framework for MSMEs



Note: The steps outlined below are presented in a sequential manner to guide MSMEs through the decision-making process within this selection framework. However, it is understood that many MSMEs may already be engaged in certain aspects of these processes. Such enterprises are encouraged to adapt, skip, or selectively apply the relevant steps according to their current operational maturity and specific needs.

2.2.4 REFLECTIONS FROM THE GROUND

Presence of RE-CE Approaches

- 1 **Dominant R Strategies:** For cluster level, there is marked presence of Recycling and Upcycling model. Knowledge on other business models is lacking.
- 2 **Mismatch in Quality vs. Price:** Brands want recycled yarns that match virgin quality but are unwilling to absorb higher costs, putting recyclers in a no-win market trap.
- 3 **Segregator Skill Gap:** There is a significant knowledge gap among segregators, particularly in identifying fibre blends and sorting for high-value recovery. Standardised training is missing.
- 4 **Planned Obsolescence:** Many brands continue to promote fast fashion and low product lifespans, which undermines the recyclability of garments and contributes to the waste inflow.
- 5 **Lack of Urgency:** MSMEs do not feel there is any urgent need to switch to more circular processes.
- 6 **Policy Asymmetry:** Lack of consistent circularity policies across major textile-producing countries creates competitive imbalances, disadvantaging clusters in stricter regulatory environments.

2.2.5 CASE STUDIES

R0: Refuse → Poornabhavaa

R1: Rethink → Flyrobe

R2: Reduce → Maya Coleman

R3: Reuse → ReFash

R4: Repair → Darn It!; Rafugiri

R5: Refurbish → Wasted 360°

R7: Repurpose & Upcycling → Bunko Junko; I Was A Sari

R8: Recycle → Circular Handspun

Note: Some of the R strategies exhibit overlapping features, with only subtle distinctions in their scope and application (refer to section 2.2.2). It is therefore recommended to interpret these principles holistically, particularly those between R5 (Refurbish) and R7 (Repurpose).

For R6 (Remanufacture), there is limited evidence of direct implementation within the textile industry at present. This principle is currently more established in sectors such as automotive and heavy manufacturing, where component reassembly and performance restoration are integral to production cycles.

R0: Refuse → Poornabhavaa

Circular Innovation: Eliminating Unsustainable Branding Waste

Poornabhavaa is an India-based **sustainable labelling and accessories brand** that replaces conventional polyester or PVC garment tags with 100% recycled textile and paper tags. The enterprise “refuses” unsustainable, single-use branding materials that traditionally end up as landfill waste and introduces closed-loop alternatives compatible with textile recycling streams. By offering circular tags, trims, and labels made entirely from post-industrial cotton and recycled paper pulp, Poorna Bhava helps fashion brands transition toward waste-free packaging and traceable, eco-positive branding components.



Click Here To Know More: <https://pspindia.net/>

Image Source @Punarbhavaa

R1: Rethink → Flyrobe

Flyrobe was India's first **online fashion rental platform**, launched in 2015, that allowed users to rent premium designer outfits and accessories for weddings, parties, and special occasions instead of purchasing them.

This model brings in affordability and variety without the burden of ownership, pioneering the concept of the shared wardrobe in India and promoting a more sustainable, experience-driven model of fashion consumption.



Image Source @Flyrobe

Click Here To Know More : <https://www.instagram.com/flyrobe/?hl=en>

R2: Reduce → Maya Coleman

"One could say that trying to solve this climate crisis is like trying to solve one giant puzzle, and I am in the process of fitting my piece in."

- Maya Coleman

Maya Coleman is a zero-waste fashion designer whose work focuses on pattern drafting that uses the entire fabric without generating offcuts.

Her process treats design like solving a puzzle, arranging garment pieces in a way that leaves no leftover scraps. The result is clothing that is stylish and functional while eliminating textile waste at the design stage.

Click Here To Know More :

<https://www.mayacolemandesign.com/zero-waste-design>



Image Source @Maya Coleman

R3: Reuse → ReFash

Clothing Swaps & Reuse Model

Refash promotes reuse of clothing through swap events where people exchange garments instead of buying new extending the life of clothes, reduce textile waste, and lower the demand for virgin resources.

Clothing swaps show how simple reuse models can extend garment life, cut waste, and open up low-cost, community-driven business opportunities that MSMEs can replicate locally.

How It Works

- Participants bring gently used garments.
- Clothes are swapped with others, giving each piece a new life.
- Leftover garments are redirected to upcycling or donation partners.

Click Here To Know More : <https://refash.in/>



"Swap, Thrift & Sip" events in Delhi, where conscious consumers exchange clothing while engaging in sustainability discussions.

Disclaimer - Health and Hygiene is a priority here, as the consumers must wash and use it again.

R4: Repair → Darn It!; Rafugiri

Darn It!

Connecting Menders and Consumers Digitally

India: Circular Design India; Iro Iro Zero Waste

UK: The Right Project; Esthetica

Supported By: British Council and UAL-FTTI



Image Source @British Council

Project Darn It aims to tackle the climate crisis by integrating traditional mending practices with modern fashion consumption. The project seeks to create a digital platform that connects consumers with a vast network of skilled menders across India, making garment repair accessible and reviving craft-based textile repair.

Source: British Council's New Landscape India R&D Grant Scheme - https://www.britishcouncil.in/sites/default/files/new_landscapes_booklet.pdf

Rafugiri, The Cloth Surgeon

Creative Embellishments & Art of Invisible Mending



Image Source @Textiel Factorij

Rafugiri is an ancient art of textile repair, passed through the generations, involving skillful mending of torn or damaged fabrics using intricate and invisible stitching techniques.

In the valleys of Kashmir, Rafugari ensured preservation and extending the life of these precious garments while turning repair into an act of craftsmanship. It's a way of preserving heritage and encouraging sustainability in fashion and textiles.

Source: Textiel Factorij, Read More - <https://www.textielfactorij.org/rafoogar-the-cloth-surgeon/>

R5: Refurbish → Wasted 360°

Circular Innovation: Restoring Fashion Waste into Contemporary Collections

Ann Anra's Wasted 360° is a Chennai-based sustainable fashion initiative that refurbishes post-industrial and pre-consumer textile waste into new, high-value garments and accessories. The brand reimagines discarded fabric panels, unsold inventory, and design offcuts, turning them into fresh, market-ready collections with minimal additional inputs.

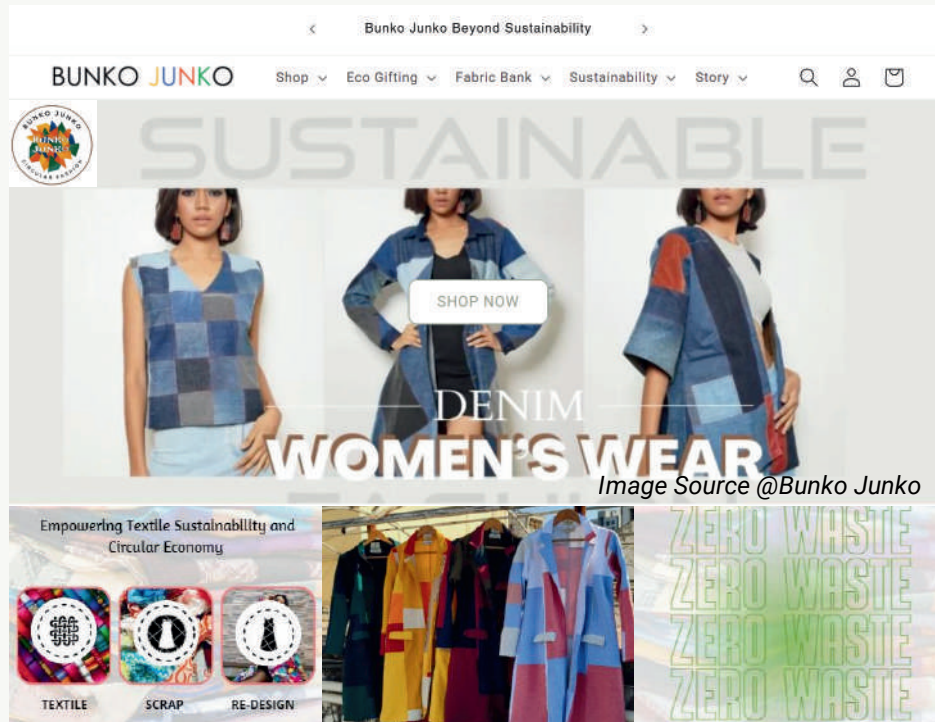
Wasted 360° demonstrates how refurbishment can restore material, cultural, and aesthetic value, thereby preventing textile waste from entering landfills while keeping jobs, skills, and materials in circulation.



Image Source @Wasted 360

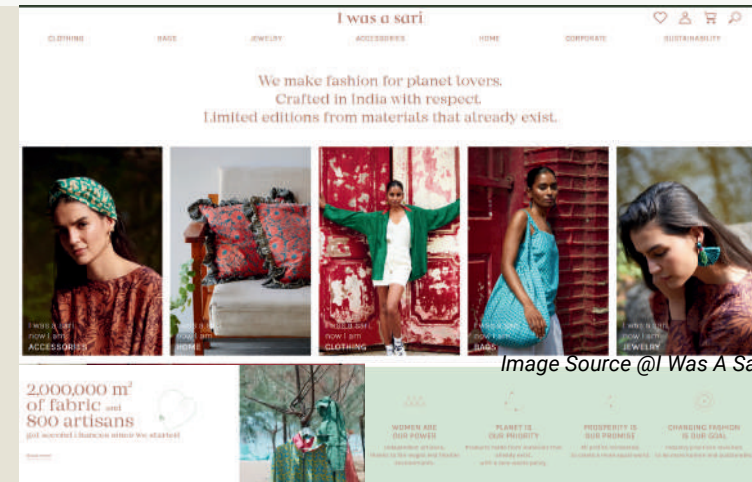
Click Here To Know More : <https://www.indiawasted.com/>

R7: Repurpose & Upcycling → Bunko Junko; I Was A Sari



Bunko Junko is a pioneering sustainable fashion and home décor brand that upcycles textile scraps into vibrant, eco-friendly products. Founded by Mrs. Bhavini Nishith Parikh, the brand blends creativity with environmental responsibility, empowering women through livelihoods and reducing waste. Recognized as the first textile upcycle manufacturer registered by the Textile Ministry of India, Bunko Junko champions innovation, sustainability, and social impact.

Click Here To Know More : <https://www.bunkojunko.com/>



I was a Sari is a Mumbai-based social enterprise that transforms pre-loved saris and textile waste into contemporary fashion and lifestyle products, while empowering underprivileged women through skills training and fair employment. Founded with the vision of combining sustainability and social impact, the organisation creates bags, accessories, and apparel from discarded fabrics, thereby reducing textile waste and giving second life to materials that would otherwise end up in landfills. By partnering with local artisans and women from marginalised communities, I was a Sari not only promotes circular fashion but also fosters economic independence, dignity, and confidence among its workforce, making it a model for inclusive and sustainable business practices.

Click Here To Know More : https://iwasasari.com/?srsltid=AfmBOoqxKli5pGWtBy3n8RSX4aXeQfBhYguHIRI44ASiwesYTPKMXTqS_

R8: Recycle → Circular Handspun

Circular Handspun

From Waste to Weave

India: Conserve India; Khamir

UK: Khadi London; Where Does it Come From?

Supported By: British Council and UAL-FTTI

The model aims to incorporate circular economy principles into the handloom sector by placing emphasis on the meeting of tradition and circularity, leveraging production using small scale innovations, promoting environmental conservation and social upliftment.

The initiative addresses the growing textile waste problem in India by repurposing cotton fabric and yarns into usable fibres and (re)integrating them into the handloom cluster level value chain.



Source: British Council's New Landscape India R&D Grant Scheme - https://www.britishcouncil.in/sites/default/files/new_landscapes_booklet.pdf

Image Source @Conserve India



2.3 Sorting Post-Consumer Textile Waste

2.3 SORTING POST-CONSUMER TEXTILE WASTE

- 2.3.1. *Post-Consumer Textile Waste*76
- 2.3.2. *Circular Pathways for Post-Consumer Textiles*82
- 2.3.3. *Sorting for Post-Consumer Textile Waste*86

2.3.1. POST-CONSUMER TEXTILE WASTE

Deriving Higher Value

Post-consumer textile waste (PCTW) is the missing piece in many circular economy conversations. While most MSMEs are already familiar with pre-consumer waste (clips, selvedges, yarn waste), the real growth in circular markets – especially for brands and exports – is coming from post-consumer flows: used garments, home textiles and fashion returns.

This chapter helps MSMEs understand what post-consumer textile waste is, how it behaves in the Indian context, and how to engage with it safely and profitably.



Image Source: Conserve India

Types of Textile Waste

Pre-Consumer Textile Waste	Post-Consumer Textile Waste
Pre-consumer textile waste refers to all the material discarded before a textile product reaches the consumer. This includes waste generated during manufacturing, cutting, dyeing, weaving, and quality checks.	Post-consumer textile waste is discarded after the product has been used by the end consumer. It typically includes used garments, home textiles, and fashion accessories that are worn-out, outdated, or damaged.
This is the most accessible and recoverable waste stream for MSMEs, as it is clean, traceable, and often generated in-house.	This waste is harder to process due to contamination, blending, & sorting needs, but it offers high potential for recycling when collected properly.

What is Post-Consumer Textile Waste?

Post-consumer textile waste includes any textile product that has been used by a consumer or institution and then discarded, donated, or returned, for example:

- Worn garments (T-shirts, shirts, jeans, dresses, sweaters, saris, etc.)
- Household textiles (bedsheets, towels, curtains, blankets, upholstery)
- Workwear and uniforms (industrial, hospital, school, corporate)
- Export returns and unsold stock that has already entered retail or e-commerce channels

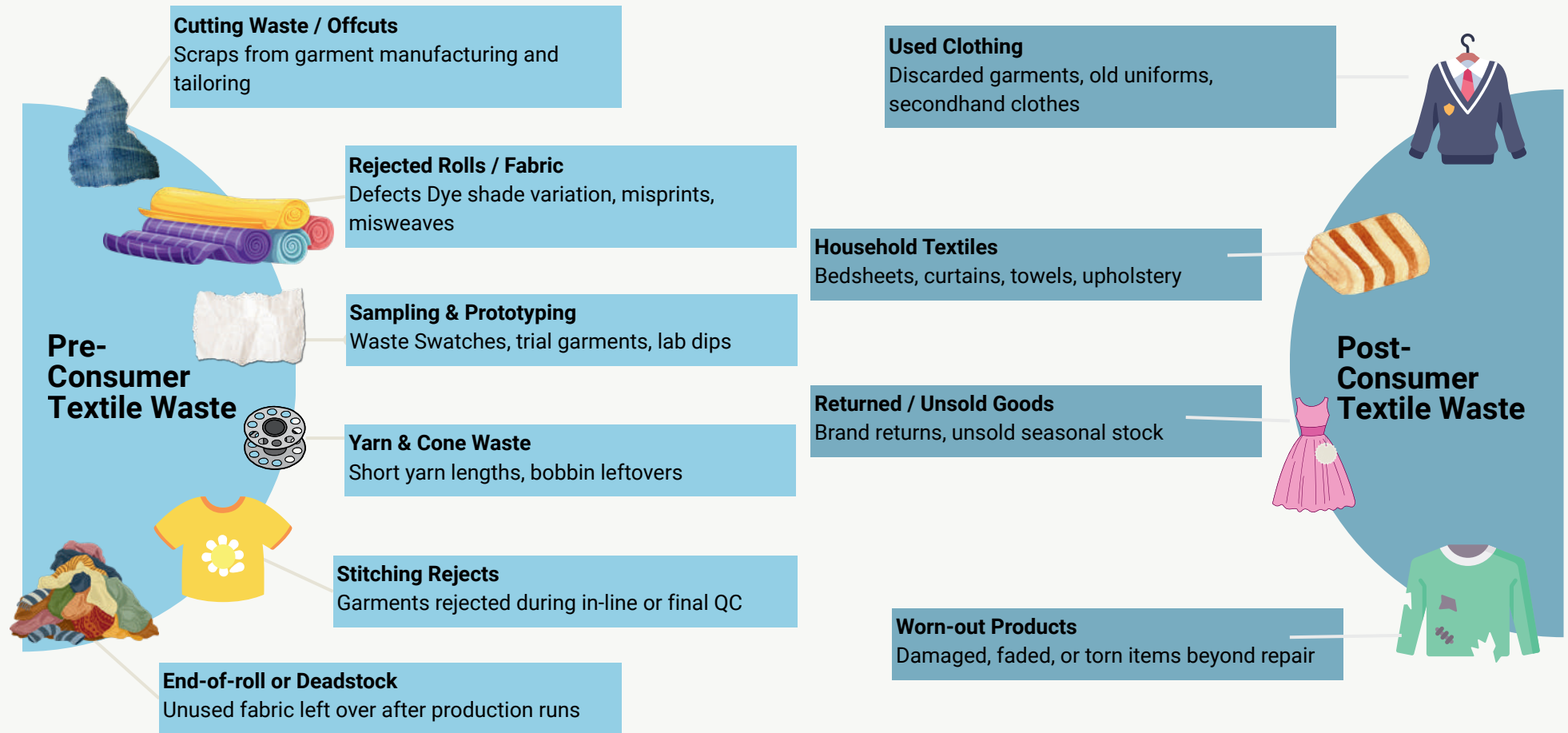
Where Does Post-Consumer Textile Waste Come From?

In the Indian context, PCTW emerges from multiple channels:

1. Households and communities
2. Retail and brands
3. Institutional users
4. Import and re-export flows (cluster-specific)

For MSMEs, it is important to map which of these sources are realistically accessible in their cluster, and at what scale and quality level.

What are these Post & Pre Consumer Textile Waste??



How is Post-Consumer Waste Different from Pre-Consumer Waste?

Aspects of Post-Consumer Textile Waste

Source	→ Households, retailers, institutions, imports
Usage history	→ Worn, washed, stored, sometimes heavily used
Cleanliness	→ Often soiled, stained, sweaty, dusty, sometimes wet
Composition	→ Frequently unknown, mixed blends, labels often missing
Contamination	→ Zips, buttons, plastics, metals, elastics, foam, non-wovens
Consistency	→ Highly variable, even within a single batch
Ease of processing	→ Needs more sorting, cleaning, sometimes only fit for downcycling

Because of these differences, post-consumer waste cannot simply be plugged into existing lines without changes in sorting, cleaning, process control and product strategy.

Key Challenges with Post-Consumer Textile Waste

Quality and consistency	• Highly variable fibre composition, colour and garment condition. • Difficult to guarantee uniform material in large lots without rigorous sorting.
Contamination and hygiene	• Dirt, stains, biological contamination, liquids in pockets, food residues. • Non-textile material: plastics, metals, leather, foam, PVC prints, reflective tapes. • Requires safe handling, PPE and proper hygiene protocols.
Fibre and blend complexity	• Increase in elastane, synthetic blends, coatings and functional finishes. • Many of these disrupt mechanical recycling and lower final product quality.
Logistics and reverse flows	• Collection is fragmented and often low-margin. • Transporting bulky, low-value mixed textiles can be expensive if not optimised.
Traceability and data gaps	• Poor documentation of origin, composition and handling. • Difficult to meet brand/regulatory requirements without some system for recording flows.
Social & compliance issues	• Strong presence of informal workers, often women, working in unsafe conditions. • Risk of child labour, low wages and lack of social protection if not proactively managed.

2.3.2 CIRCULAR PATHWAYS FOR POST-CONSUMER TEXTILES

Value Ladder

PCTW can follow multiple value pathways. A simple ladder helps MSMEs decide what to target:

- Reuse (highest value, lowest processing)
- Repair, upcycling & remanufacturing
- Mechanical recycling (fibre-to-fibre / fibre-to-product)
- Downcycling
- Energy recovery / disposal (last resort)

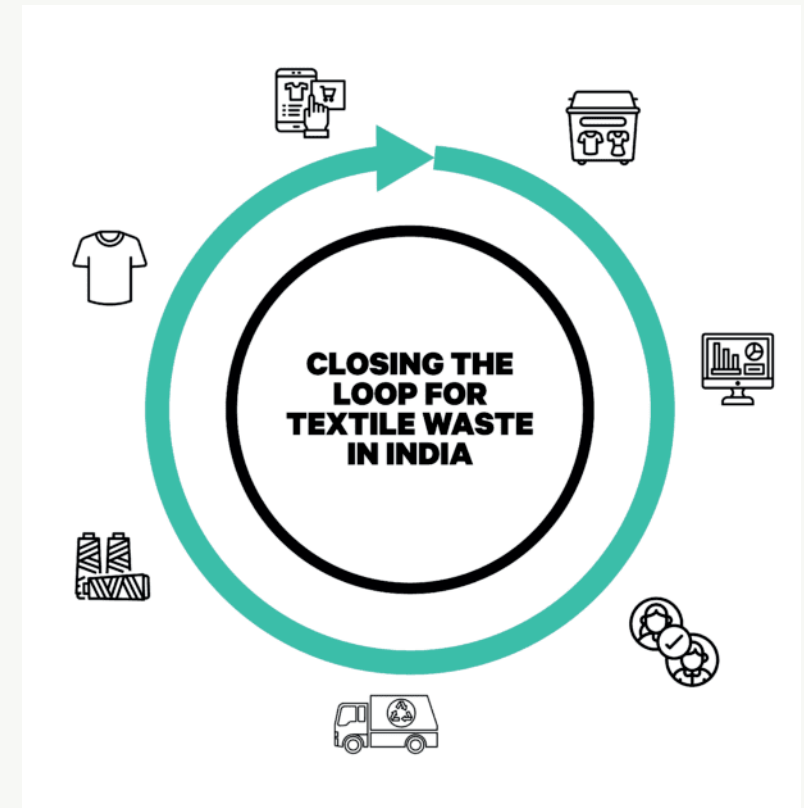


Image Source: Fashion for Good

The guidebook encourages MSMEs to move as high up this ladder as possible, but in a realistic, step-by-step manner.

Practical Entry Points for MSMEs

MSMEs do not need to handle the entire PCTW chain. They can pick one or more practical roles:

Cluster sorting and grading hub

Specialise in receiving mixed PCTW and turning it into:

- Reuse lots
- Recyclable feedstock lots (graded by fibre, shade, quality)

Sell to reuse channels and recycling units.

Use the sorting SOPs, batch cards and acceptance criteria given in this guidebook.

Recycled product manufacturer

Use pre-sorted PCTW as input to mechanical recycling lines:

- Nonwovens/felts (more tolerant of blends)
- OE yarn / shoddy yarn (for certain garment categories like denim, heavy cotton)

Partner with existing aggregators rather than building their own collection from scratch.

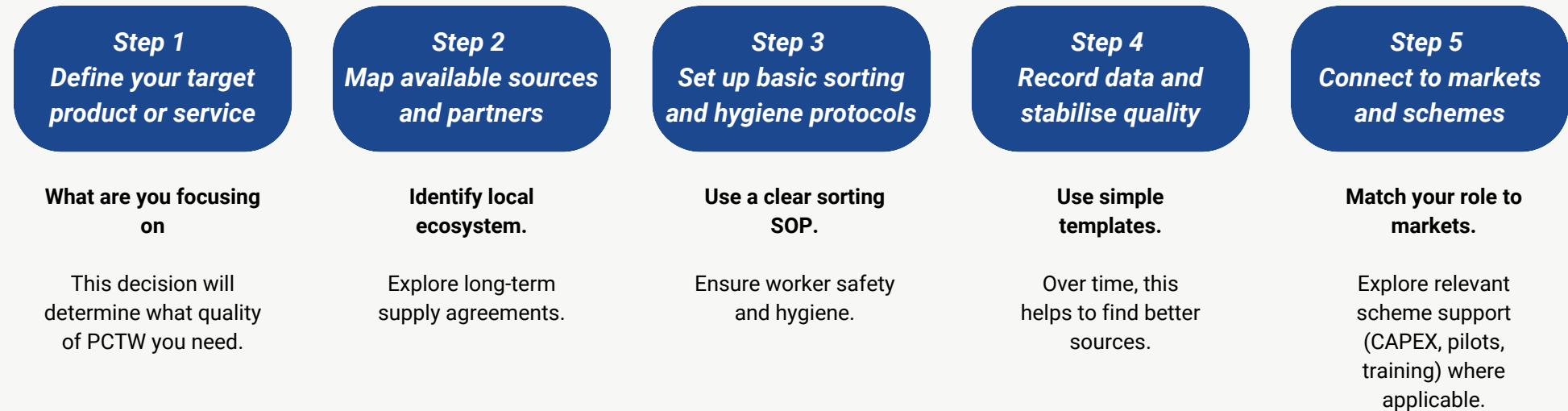
Reuse and upcycling specialist

Focus on best quality fraction of PCTW – resell, repair, upcycle.

Develop design-led products with strong storytelling for niche markets.

Approach to Working with Post-Consumer Waste

MSMEs do not need to handle the entire PCTW chain. They can pick one or more practical roles:



Social Inclusion and Safeguards

Post-consumer textile chains are labour-intensive and rely heavily on informal workers, especially women. MSMEs can add real value by:

- Formalising sorting roles gradually (contracts, predictable wages, safety training).
- Providing basic OHS gear and safe working conditions (adequate light, ventilation, seating, dust management).
- Avoiding child labour and exploitative practices in their own operations and in key suppliers.
- Partnering with SHGs, producer companies or social enterprises that represent waste pickers and informal workers.

Integrating these safeguards is not just a compliance requirement – it also improves worker retention, quality and reliability, and strengthens the MSME's position with brands and regulators.

2.3.3 SORTING FOR POST-CONSUMER TEXTILE WASTE

Deriving Higher Value

Efficient sorting is the foundation of high-value recovery in textile circularity. Poorly sorted feedstock leads to contamination, downcycling, and loss of economic potential. Advanced, data-driven sorting systems can turn mixed post-consumer waste into reliable input for reuse and recycling industries.

Why It Matters:

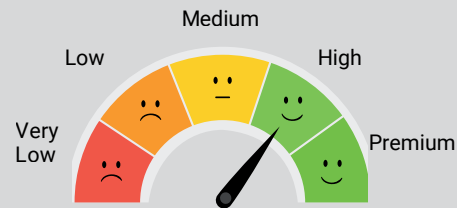
- Sorting determines whether a textile product is fit for reuse, repair, or recycling (mechanical & chemical).
- Better quality classification reduces residues and increases the share of high-value recycling.
- Enables traceable, feedstock-specific data, critical for future compliance under the EU Digital Product Passport (DPP).



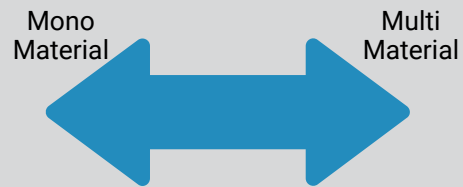
Image Source: Conserve India

Sorting Parameters

1. Condition



2. Product Construction



3. Multi-layered



4. Repairability



5. Durability



6. Colour



1. Bright
2. Dark
3. Light
4. Multi

7. Fibre Composition



- ☐ 100% Fibre 1
- ☐ 90% Fibre 1; 10% Fibre 2
- ☐ 80% Fibre 1; 20% Fibre 2
- ☐ 70% Fibre 1; 30% Fibre 2
- ☐ 65% Fibre 1; 35% Fibre 2
- ☐ 65% Fibre 1; 30% Fibre 2; 5% Elastane
- ☐ 60% Fibre 1; 40% Fibre 2
- ☐ 50% Fibre 1; 50% Fibre 2
- ☐ 98% Fibre 1; 2% Elastane
- ☐ 95% Fibre 1; 5% Elastane
- ☐ 90% Fibre 1; 10% Elastane
- ☐ 97% Fibre 1; 3% Elastane
- ☐ 90% Fibre 1; 10% Elastane
- ☐ 80% Fibre 1; 20% Elastane

8. Fibre Length



Inspired and Adapted from CISUTAC -
<https://www.cisutac.eu/solution-post-consumer-textile-waste>

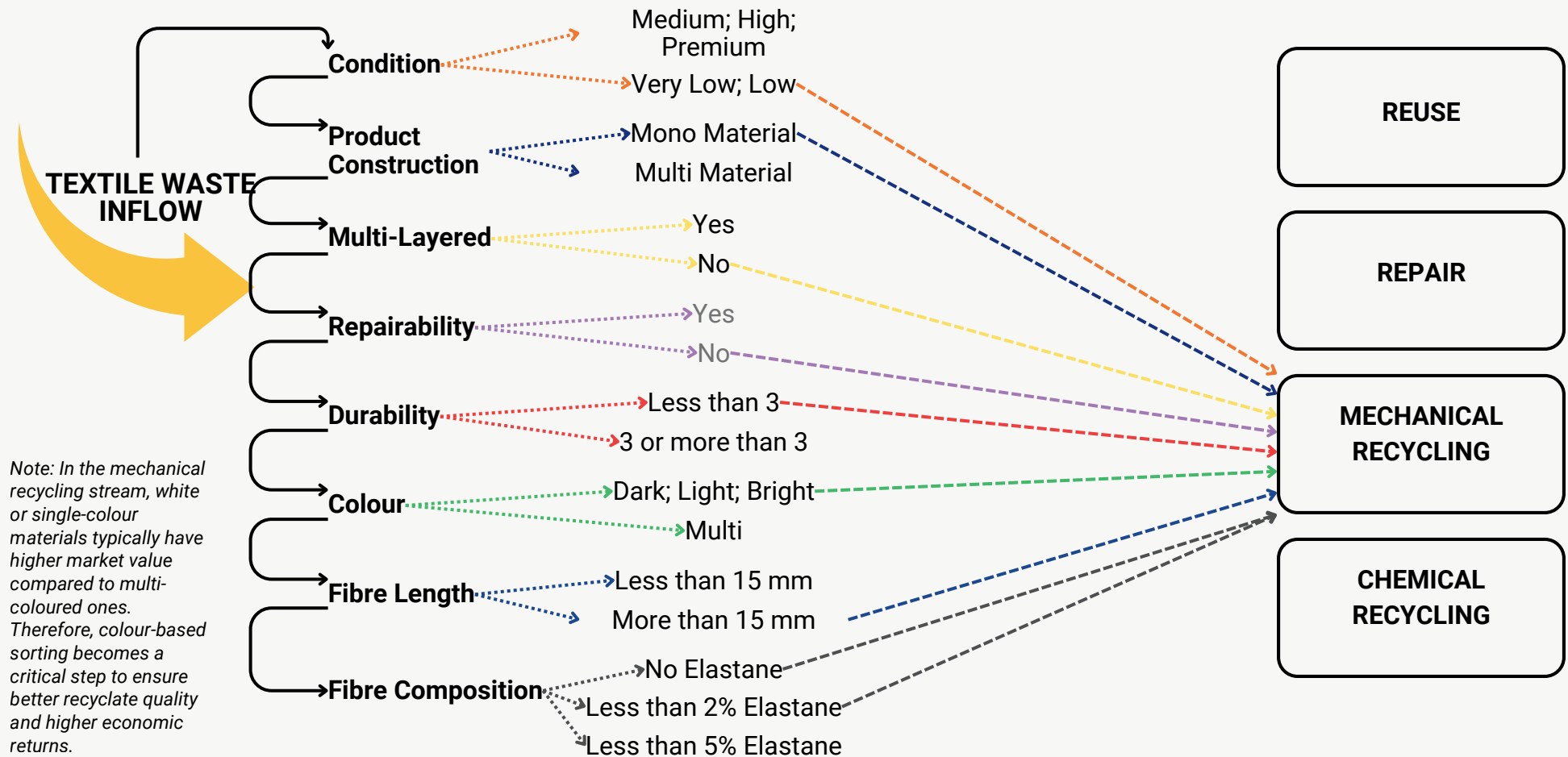
Sorting Flow - Identifying Reuse Stream



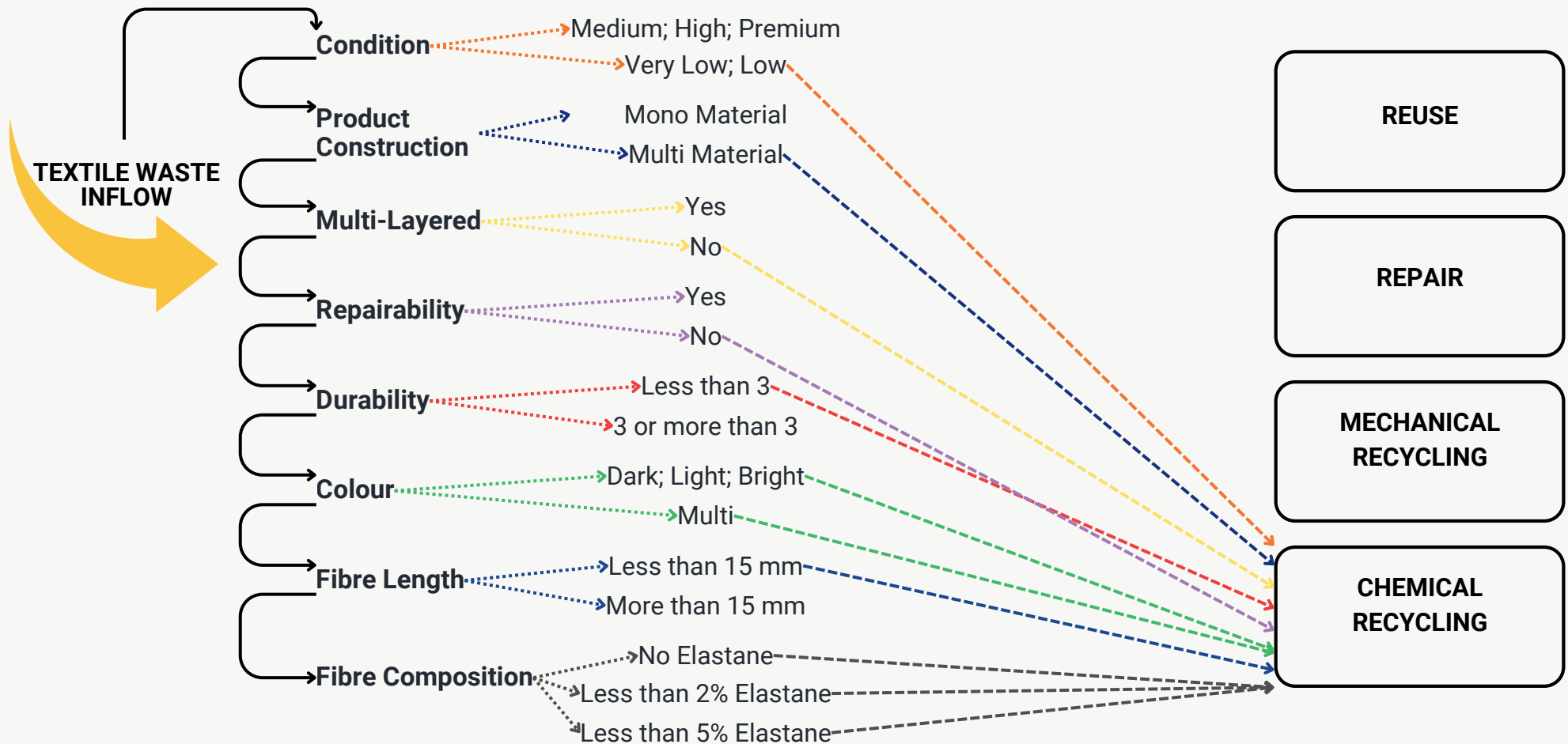
Sorting Flow - Identifying Repair Stream



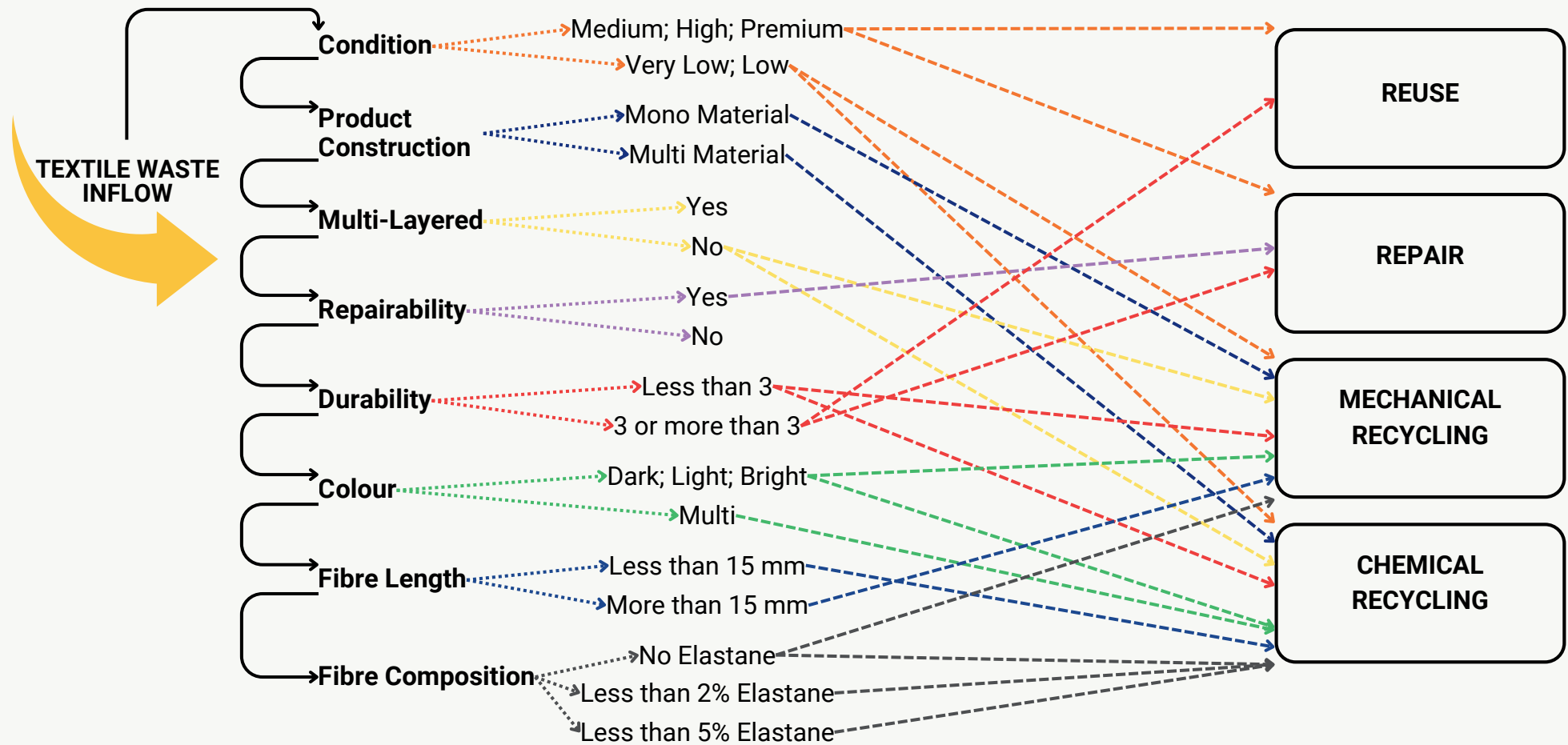
Sorting Flow - Identifying Mechanical Recycling Stream



Sorting Flow - Identifying Chemical Recycling Stream



Complete Sorting Flow - Identifying Highest Value Realisation





2.4 Deep dive into Textile recycling

2.4 DEEP DIVE INTO TEXTILE RECYCLING

2.4.1. Introduction to Textile Recycling	95
2.4.2. Textile Recycling Process	96
2.4.3. Mechanical Textile Waste Recycling.....	101
2.4.4. Mechanical Recycling Line Configurations.....	103
2.4.5. Chemical Textile Waste Recycling.....	121
2.4.6. Scaling Textile Waste Recycling.....	124
2.4.7. Reflections from the Ground.....	127
2.4.8. Case Studies	128

2.4.1 INTRODUCTION TO TEXTILE RECYCLING

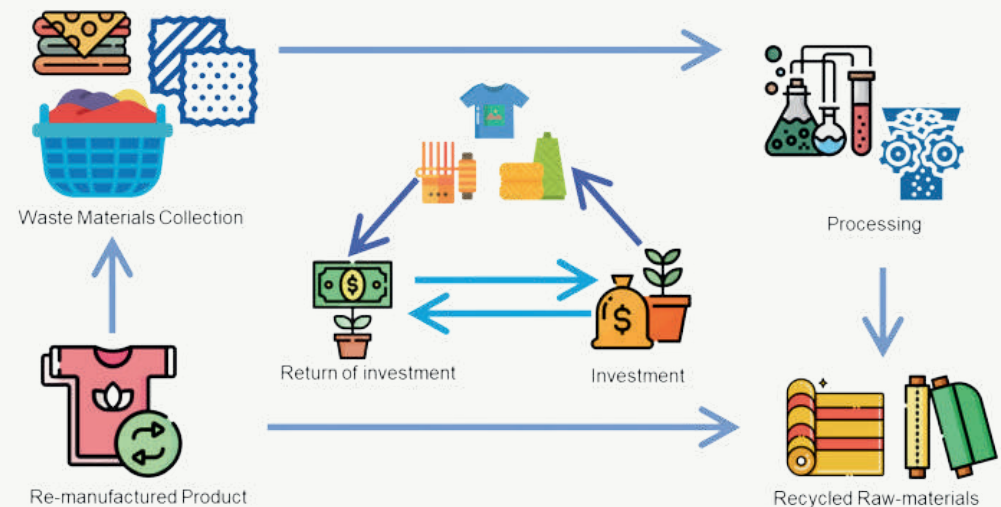
RE-CE Approach for Turning Waste into Value

Textile recycling refers to the process of collecting, sorting, and reprocessing textile waste into new raw materials that can be used again in production.

Rather than disposing of textile waste, MSMEs can recover its value by converting it into inputs for new products, such as shoddy yarn, industrial felt, insulation, wiping cloths, or even regenerated yarn.

Textile recycling is one of the most accessible RE–CE strategies for MSMEs, as it:

- Lowers virgin raw material costs
- Helps reduce landfill contribution
- Supports brand sustainability claims
- Prepares to meet future regulatory requirements



Akter et al (2024), Ch: Conversion of Textile Waste to Wealth and Their Industrial Utilisation, Book - 'From Waste to Wealth'

2.4.2 TEXTILE RECYCLING PROCESS

Merging Waste Supply Chains with the Textile Value Chain

Textile recycling is not merely an end-of-pipe waste management solution, it is a strategic circular process that connects two traditionally siloed systems:

- The textile waste supply chain
- The textile value chain

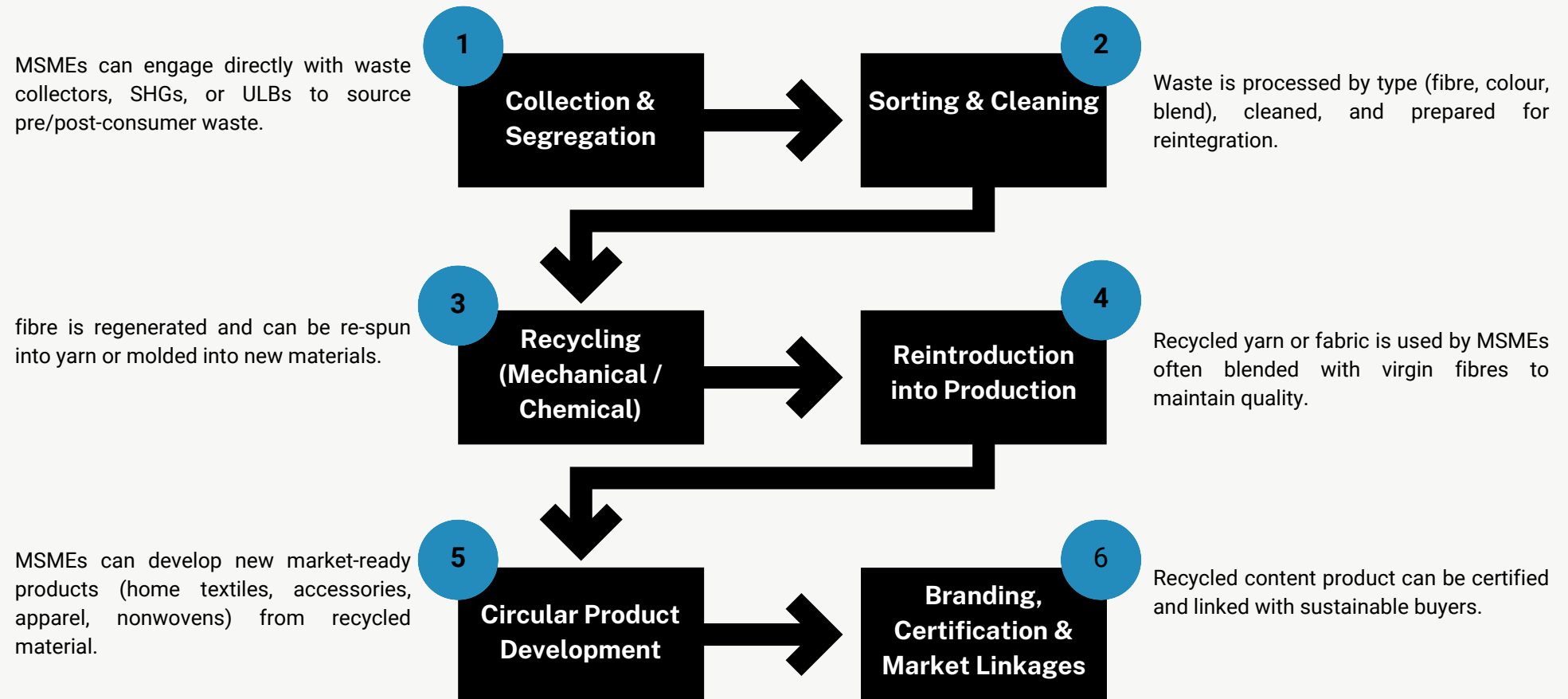
Under a RECE-aligned system, waste becomes a re-entry point, a resource that is:

- Recovered
- Processed
- Reintroduced into the production cycle



Photo Credit @Conserve India

The Process of Integration: How Recycling Enables RECE



Why This Matters for MSMEs

Strategic Benefits of Integration	Action Items for MSMEs
Cut Raw Material Costs by Using Recycled Inputs Recycled fibres offer a sustainable alternative to virgin inputs	Collaborate with recyclers or invest in small-scale tearing/shredding units to process waste
Access New Markets for Sustainable/Circular Products MSME can offer certified (GOTS, OEKO-TEX) and recycled / upcycled products	Position circular product lines as “eco-premium” offerings
Build Resilience Against Input Price Volatility Reduces dependence on volatile global commodity markets and local circular supply loops	Secure long-term waste procurement contracts with waste aggregators or NGOs
Qualify for Government Schemes and Green Financing MSMEs adopting circular operations can unlock subsidised credit and access green funding	Include RECE elements in your expansion plans and accessing financing targeted support
Comply with Future Regulations Upcoming rules like Textile EPR, traceability, and DPP regulations will soon be mandatory	Start piloting traceability tools and documentation for recycled material use
Meet Global Buyer Requirements Markets increasingly prefer apparel with recycled fibre content and circular certification	Start blending recycled fibres in production and obtain certifications to meet sourcing criteria

Bottom Line: Circular Integration = Strategic Advantage

MSMEs that embed recycling, reuse, and recovery into their production systems position themselves as future-ready enterprises - capable of adapting to changing regulations, responding to buyer demands, and innovating with resource constraints.

But more importantly, circular integration enables MSMEs to:

Break free from legacy limitations (low margins, high dependency, linear production)

Demonstrate leadership within their cluster or supply chain

Diversify offerings—not just through products, but through services like repair, take-back, or rental

Engage in ecosystem-building by partnering with informal sector actors, recyclers, SHGs, and innovation platforms

Reimagine their identity as contributors to a just, green transition—not just survival-focused units

In this sense, circularity is not just a technical or environmental shift. It's a business model transformation.

Those MSMEs that act early, by integrating waste as a resource, can shape new narratives, unlock new revenue streams, and become central players in India's transition to a sustainable textile economy.

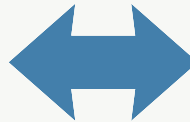
Textile Recycling Methods

There are broadly two categories of textile recycling methods: mechanical recycling and chemical recycling. Each method has its applications depending on the type of textile waste (natural fibres like cotton/wool, versus synthetics like polyester, or blends) and the desired quality of output.

Mechanical Recycling

Mechanical recycling involves physically tearing or shredding textile waste (like fabric scraps, stitching rejections, or unsold goods) back into loose fibre. These fibres are then re-carded and spun to make low-cost yarn, compressed into felt, insulation, and mats, or blended with other fibres to create new fabrics.

You can sell your sorted cotton waste directly to a recycler for cash or invest in or share a small tearing or carding machine to recycle your own waste in-house.



Chemical Recycling

Chemical recycling uses solvents, enzymes, or heat treatments to break down textile fibres at the molecular level. This is especially useful for blended fabrics like poly-cotton, which can't be shredded easily or spun back into usable yarn through mechanical methods.

If your waste is blended, synthetic, or hard to separate, chemical recycling might be the only way to recover its value.

2.4.3 MECHANICAL TEXTILE WASTE RECYCLING

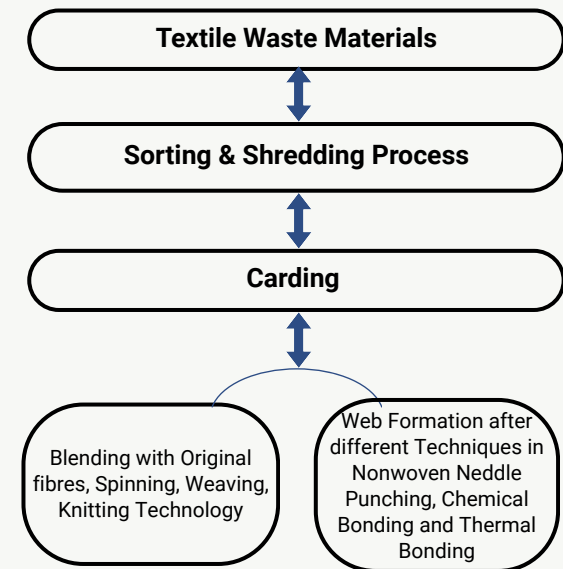
Mechanical Recycling – A Practical MSME Solution

Mechanical recycling is the physical process of converting textile waste back into usable fibre without changing its chemical structure. It involves tearing, shredding, and carding of textile waste to produce loose fibres, which can then be spun into yarn, compressed into felt, or used as padding and insulation.

Common Outputs

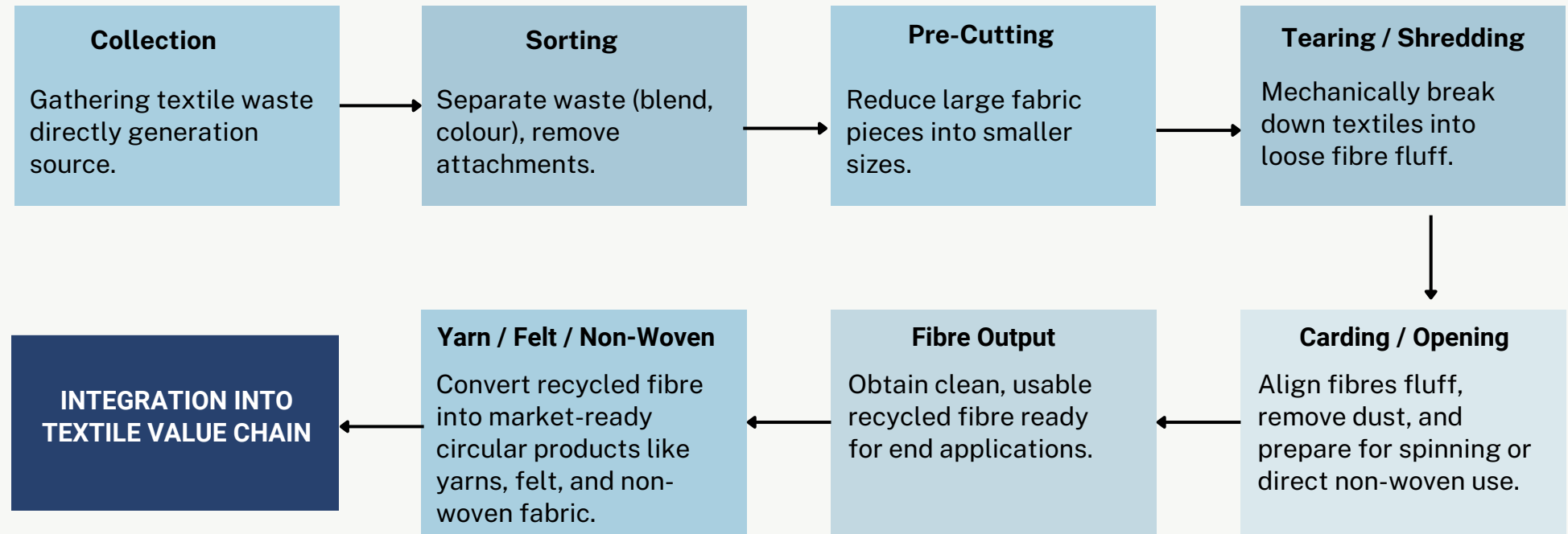
- **Recycled Yarn** - OE spun yarn for fabric and garments
- **Shoddy yarn** - used in blankets, durries, and upholstery.
- **Felt & non-wovens** - used in mattresses, padding, automotive interiors.
- **Wiping cloths & mops** - for industrial and household use.

Mechanical Recycling



Adapted from Guru et al (2025), Perspective Chapter: Functional Applications in Textile Reuse and Recycling -Enhancing Sustainability and Reducing Environmental Impact

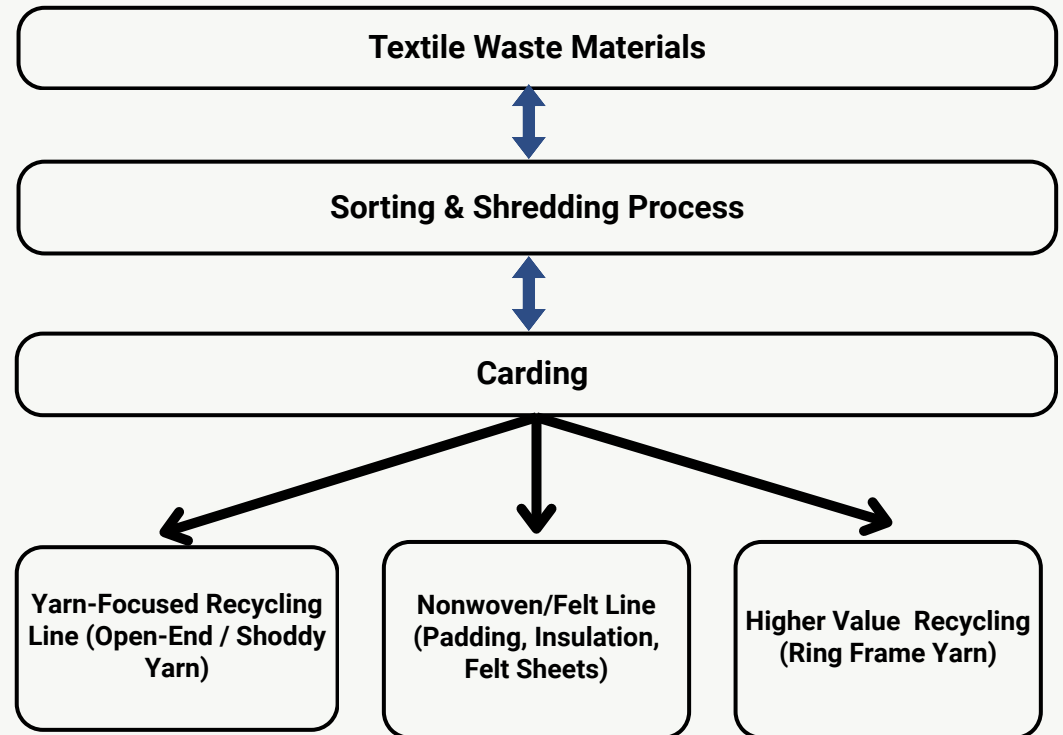
How Mechanical Recycling Works – Overview



2.4.4 MECHANICAL RECYCLING LINE CONFIGURATIONS

Three Aspects to explore

1. Yarn-Focused Recycling Line (Open-End / Shoddy Yarn)
2. Nonwoven / Felt Line (Padding, Insulation, Felt Sheets)
3. Advancing Higher Value through Mechanical Recycling



Adapted from Guru et al (2025), Perspective Chapter: Functional Applications in Textile Reuse and Recycling -Enhancing Sustainability and Reducing Environmental Impact

Yarn-Focused Recycling Line (Open-End / Shoddy Yarn)

Suitable for MSMEs that want to produce recycled yarn. MSMEs can convert sorted pre- and post-consumer textile waste into recycled yarn (mainly OE / shoddy yarn) for blankets, rugs, durries and low-medium count fabrics.

Typical Products & End Uses

1. Yarn types

- a. Coarse to medium OE yarn (e.g., Ne 6–16, depending on waste quality and blending).
- b. Shoddy yarn (from mixed fibres, often for blankets and low-cost fabrics).

2. End uses

- a. Blankets, durries, carpets, rugs.
- b. Low-count woven or knitted fabrics for home textiles, interlinings.
- c. Sometimes blended with virgin fibre to improve quality for apparel- adjacent uses.



Photo Credit @Conserve India

Note: Photo depicting rugs made from recycled yarn

Input Feedstock – What This Line Can Handle

Preferred feedstock

- Cotton-rich knit clips and cuttings (from Tiruppur, Ludhiana-type clusters).
- Woven cotton waste (fabric selvages, roll ends, loom waste).
- Yarn waste from spinning and weaving units.
- Selected post-consumer garments:
 - Mostly cotton or cotton-rich.
 - Low elastane (e.g., up to ~3–5%); limited polyester blends if target is coarse yarn.
 - Not heavily soiled or wet; minimal oil/grease contamination.

Feedstock conditions for good yarn

- Fibre length: longer and less damaged fabric/yarn waste is better.
- Elastane: very high elastane or highly stretchy fabric leads to processing issues and weak yarn; should be removed at sorting.
- Contaminants: zips, buttons, labels, thick seams, plastic accessories, metal pieces should be removed to protect machines.

Process Flow – Step-by-Step

1. Sorting & Grading

- Sort waste by fibre family; colour family; and intended product

2. De-Trimming & Pre-Processing

- Manual or semi-automatic removal of zippers, buttons, hooks, elastic waistbands, labels, hard seams
- Objective: protect machines, reduce metallic and plastic contamination

3. Tearing / Opening (Rag-Tearer / Opener)

- Function: opens fabric into loose fibre flocks
- Key settings like feed rate, roller speed, and pinning must be tuned to avoid over-fibre damage

4. Fine Opening & Cleaning (Garnett / Fine Opener)

- Removes dust, sand, short fibre and residual contaminants
- Multiple cylinders and workers improve cleaning but also create more short fibre – a balance is needed

5. Carding & Blending

- Carding machine forms a web or sliver from opened fibres
- Opportunity to blend different waste streams (e.g., white clips + light shade clips) or add virgin fibre (cotton, polyester, wool) to improve yarn strength and consistency

6. Spinning – Open-End (Rotor Spinning)

- Carded sliver is fed to OE rotors to make yarn
- Key control points like rotor speed, draft ratio and waste quality
- Typical counts like Coarser counts (e.g., Ne 6–10) and slightly higher counts (e.g., up to Ne 16–20)

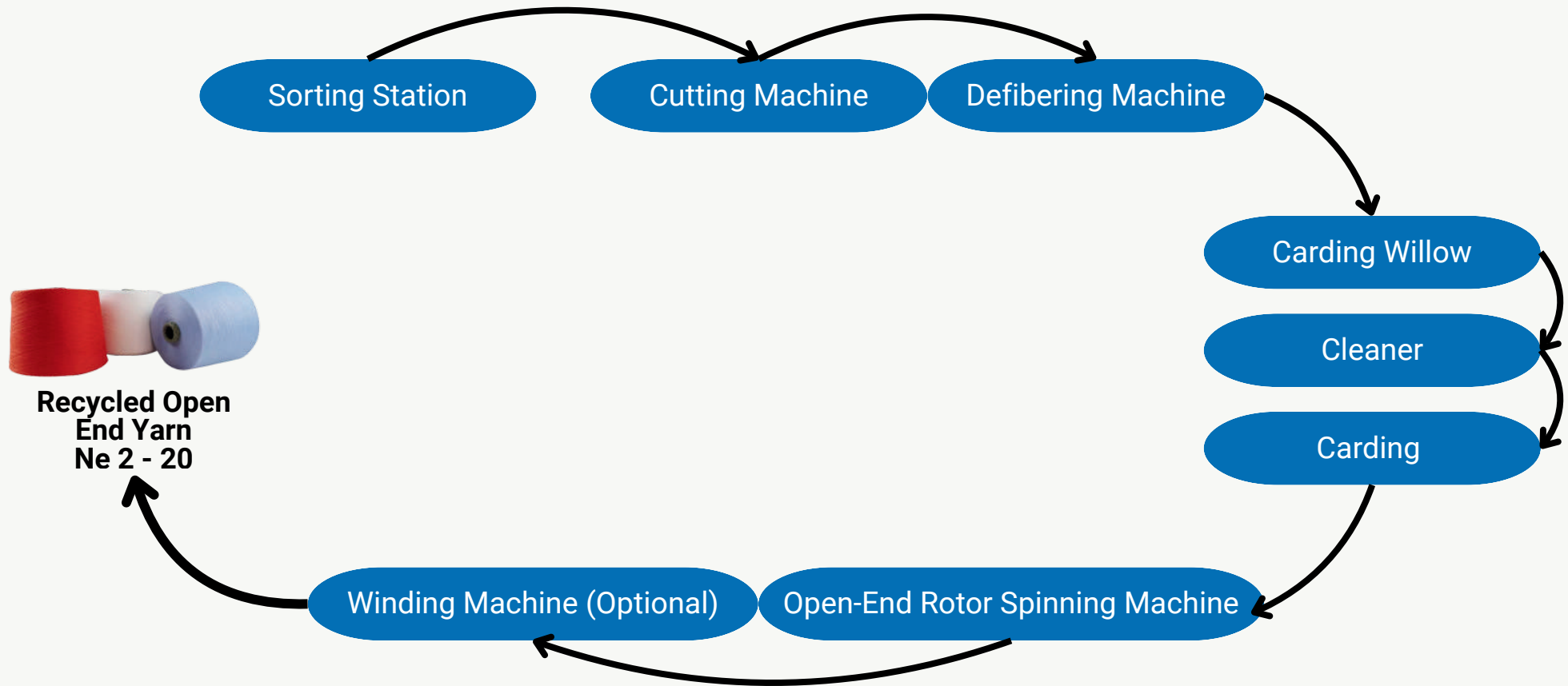
7. Winding, Clearing & Packing

- Yarn is wound onto cones or packages
- Basic quality checks like yarn count, CV%, visible defects, slubs, and thick/thin places
- Packed and labelled with recycled content %, input type, batch ID, production date

Capacity for line setup

People, Roles & Skills

- **Typical roles:**
 - Sorting team (mainly women workers in many clusters) – 4–10 people per shift, depending on volume.
 - Machine operators for tearing/opening, carding and OE machines (2–4 operators).
 - Helpers for feeding, doffing, bale handling (4–6).
 - One line supervisor / production in-charge.
 - One maintenance technician (shared between lines in larger units).
- **Skill requirements:**
 - Basic understanding of fibre behaviour and waste grading (for sorters and supervisors).
 - Machine setting and troubleshooting for operators.
 - Basic record-keeping for batch tracking and yield monitoring.



Risk Points & Practical Tips for MSMEs

Common issues:

- *Machine damage from hidden metal parts → mitigate via strong de-trimming and magnets/metal detectors.*
- *Excess short fibre due to aggressive opening or poor feedstock → results in low yarn strength and high waste.*
- *Inconsistent feedstock from different suppliers → frequent shade and quality variation.*

Practical tips:

- *Start with 1–2 clearly defined feedstock streams (e.g., “light shade cotton knit clips” and “dark shade knit clips”) before expanding to more complex blends.*
- *Maintain a simple incoming feedstock log (source, type, weight, grade) and a matching yarn batch log for basic traceability and quality troubleshooting.*
- *Consider partnering with a cluster-level sorting hub so that the spinning unit receives pre-graded and de-trimmed feedstock, reducing labour and risk.*

Nonwoven / Felt Line (Padding, Insulation, Felt Sheets)

Suitable for MSMEs that want to convert mixed textile waste into felt, padding and nonwoven products for applications in packaging, furniture, automotive, construction and home textiles.

Typical Products & End Uses

1. *Product types*

- a. Needle-punched felt sheets and rolls.
- b. Thermal-bonded padding/insulation.
- c. Sound-absorbing panels and boards.
- d. Cushioning layers for mattresses, furniture, carpets.
- e. Protective felt for flooring and packaging.

2. *Typical End uses*

- a. Construction: thermal and acoustic insulation panels, underlay.
- b. Automotive: door trims, roof liners, trunk linings, acoustic pads.
- c. Furniture and bedding: cushioning, mattress layers, sofa padding.
- d. Packaging and logistics: protective mats, moving blankets, edge protectors.
- e. Household: under-carpet felt, shoe insole felt, cleaning pads.

Input Feedstock – What This Line Can Handle

Feedstock flexibility (the big advantage)

- Can accept a wider range of blends and colours compared to yarn spinning.
- Common feedstock types:
 - Cotton/polyester blended fabrics (knits and wovens).
 - Wool/acrylic blend fabrics and yarns.
 - Mixed pre-consumer waste like cutting room waste, clips, selvages, rejected rolls.
 - Selected post-consumer waste for garments and household textiles that are too blended or short-fibre for yarn.

Feedstock conditions for felt

- Contaminations like zips, buttons, hooks, hard plastics and metal must still be removed to protect machines.
- Avoid heavily oily/greasy or wet materials; they can cause needle fouling, bad bonding and odour.
- Blend content like Synthetic fibres (polyester, acrylic) can help thermal bonding and improve resilience and
- Very high elastane still problematic, best to minimise at sorting stage.

Process Flow – Step-by-Step

1. Sorting & Grading

- Separate waste into broad families like Cotton-rich vs synthetic-rich vs wool/acrylic blends or Light vs dark shades (only critical where lighter or specific colour felts are required).
- Identify and set aside very dirty, wet or chemically contaminated waste along with highly elastic fabrics for limited/balanced use.

2. De-Trimming & Pre-Processing

- Remove metal, plastic accessories (zips, buttons, hooks), thick seams, waistbands, labels, and foams.
- Cut large garments or fabric pieces into sizes that can be fed easily into the opener.

3. Tearing / Opening (Rag-Tearer / Opener)

- Function: opens fabric into loose fibre flocks.
- Key settings like feed rate, roller speed, and pinning must be tuned to avoid over-fibre damage.

4. Blending & Dosing

- If needed, combine different waste streams to reach desired blend (e.g., cotton/poly ratio).
- Virgin fibres or binder fibres (e.g., low-melt polyester) to improve bonding and product strength.
- Controlled dosing systems or blending conveyors can be used; in small lines, blending may be manual but should follow clear recipes.

5. Carding & Blending

- Carding machine forms a web or sliver from opened fibres.
- Feed consistency and card settings to minimise thin/thick areas.

6. Cross-Lapping

- Cross-lapper folds the web back-and-forth to build required thickness and GSM.
- Critical for controlling GSM (grams per square metre) and achieving isotropic strength (similar strength in machine and cross direction).

Process Flow – Step-by-Step

7. Bonding – Needle-Punch or Thermal

- Needle-punch bonding
 - Web passes repeatedly under needle boards with barbed needles.
 - Needles mechanically entangle fibres vertically and horizontally.
 - Adjustments for needle density (needles per metre), punch frequency and penetration depth, line speed (slower speed → more punches → denser felt).
- Thermal / calender bonding (for synthetic-rich blends)
 - Web passes through heated rollers or ovens.
 - Low-melt synthetic fibres soften and bond neighbouring fibres.
 - Often combined with light needle-punching for better structure.

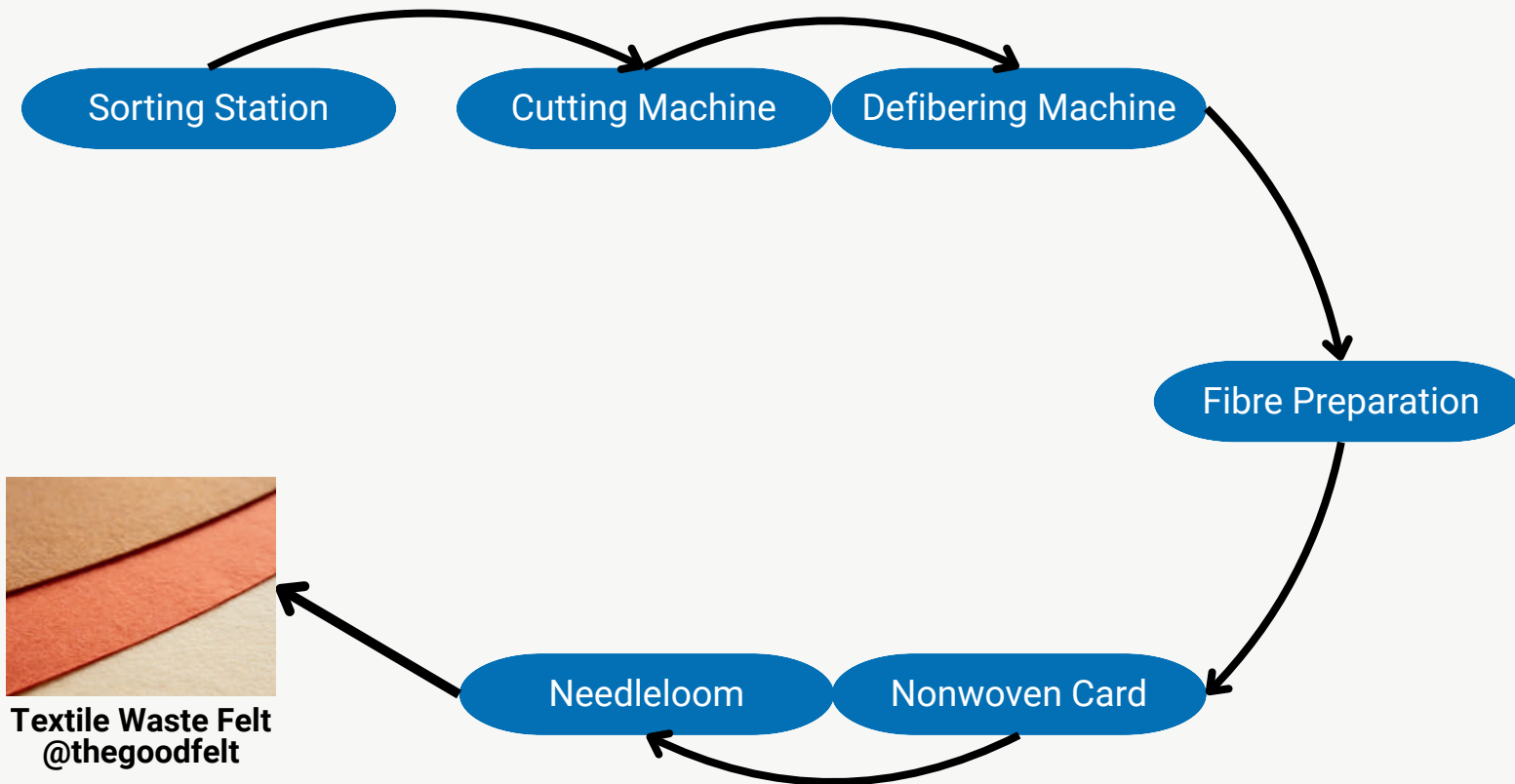
8. Trimming, Finishing & Packaging

- Cutting to desired dimensions (sheets, rolls, specific shapes).
- Optional - Surface treatments or laminations (e.g., aluminium foil for insulation panels, fabric facing for aesthetic uses).
- Labelling with information on product type, GSM, thickness, recycled content %, batch ID, intended end-use.

Capacity for line setup

People, Roles & Skills

- **Typical roles:**
 - Sorting and pre-processing team with 4–10 workers per shift depending on input tonnage.
 - One machine operator each for opening, carding, cross-lapper, needle looms/thermal units.
 - Helpers for feeding, doffing, material handling, cutting, packing (4–8 per shift).
 - Supervisor / production in-charge for coordinating feed planning, quality, and order scheduling.
 - Maintenance technician for maintenance, needle changeovers, lubrication, safety checks.
- **Skill requirements:**
 - Understanding of GSM, thickness and basic textile behaviour.
 - Ability to adjust machine settings to correct visible defects (holes, thin spots, uneven density).
 - Awareness of safety procedures around needle looms and hot surfaces.



Risk Points & Practical Tips for MSMEs

Common issues:

- *Uneven GSM or thickness caused by inconsistent feeding, poor carding, or cross-lapper settings → leads to quality claims and rejections.*
- *Needle breakage / excessive wear from residual metal/plastic contaminants or poor maintenance.*
- *Poor bonding or weak felt when blend has too many short fibres or insufficient binder/synthetic content.*
- *Dust and fibre fly creates health risks and housekeeping burden if extraction is inadequate.*

Practical tips:

- Start with limited product SKUs and stabilise quality before expanding the catalogue.
- Develop simple blending recipes and record them as SOPs.
- Maintain a preventive maintenance schedule for more consistent products and reduce energy consumption.
- Work with buyers early to co-design specifications – for many applications and performance requirements allowing higher recycled content and blended waste usage.

Advancing Higher Value through Mechanical Recycling

Mechanical recycling in India is often associated with coarse OE or shoddy yarn. However, with the right feedstock, preparation, and spinning practices, MSMEs can move “up the value ladder” by producing ring-frame yarn with recycled content that can be used in higher-value knitwear and woven fabrics. This section outlines what changes when you move from OE yarns to ring-frame yarn with recycled fibres, and what MSMEs need to plan for.

What “Higher Value” Means in Practice

- Shifting to ring-frame yarn with recycled content typically enables:
 - Finer counts compared to typical OE shoddy yarns.
 - Better strength and evenness, suitable for knitwear and apparel-adjacent fabrics.
 - Higher price realisation per kg, especially where brands demand verified recycled content.
 - Access to export and compliance-driven markets (when combined with traceability and relevant certifications).
- However, this comes with stricter requirements on fibre quality, process control and investment.

Why Ring-Frame with Recycled Fibre Is More Demanding

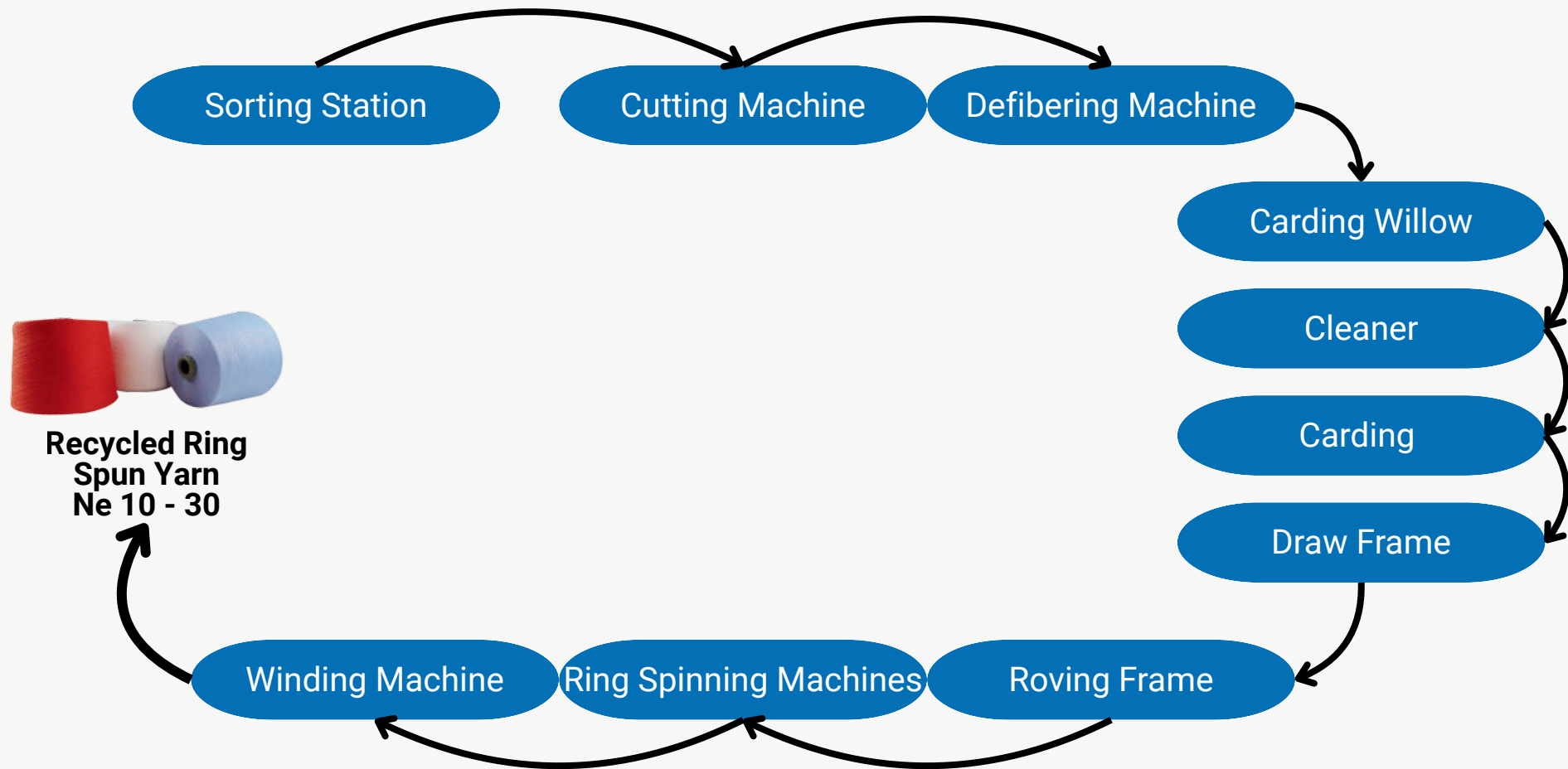
Ring spinning, unlike OE spinning, has:

- Higher demands on fibre length and strength
- Greater sensitivity to short fibre content, neps, and trash
- Tighter tolerance limits for blend variation and contamination

If the fibre is too short, too damaged, or too dirty, ring frames will not run stably or will produce poor yarn.

Therefore, moving to recycled ring-frame yarn is less about “buying a new spinning machine” and more about upgrading the entire upstream chain:

- Feedstock selection and sorting
- Gentle and controlled mechanical opening
- Advanced fibre preparation (carding, drawing, often combing)
- Well-designed blends of recycled and virgin fibres



Conditions for Success – What Needs to Change

1. Feedstock Strategy:

- Prioritise cleaner, more homogeneous waste streams
- Limit elastane and disruptive blends
- Shade control

2. Gentle Mechanical Opening:

- Use multi-stage opening with controlled intensity rather than very aggressive tearing
- Adjust machine settings to reduce fibre breakage

3. Fibre Preparation – Beyond Basic Carding:

- High-quality carding
- Drawing and blending stages
- Combing (where higher counts are targeted)

4. Blend Design (Recycled + Virgin Fibre):

- Recycled content can be gradually increased
- Suitable virgin fibres

Adopting Mechanical Recycling: Challenges and Opportunities



Common Challenges

- *Lower fibre Strength*
- *Contamination Issues*
- *Material Sorting Complexity*
- *Space and Infrastructure Needs*
- *Recycled Products Market Access*



Practical Solutions

- *Blend Strategy*
- *Dedicated Sorting, De-trimming*
- *Shared Facilities*
- *Training and Skill Building*
- *Buyer Engagement*



Opportunities for MSMEs

- *Waste Monetisation Models*
- *Joint Investment in Machinery*
- *Launch Recycled Product Lines*
- *Service Model*
- *Partnership with Export Buyers*



Benefits for MSMEs

- *Extra Income from Waste*
- *Reduced Raw Material Costs*
- *Market Advantage with Buyers*
- *Compliance and Recognition*
- *Cluster-Level Synergies*

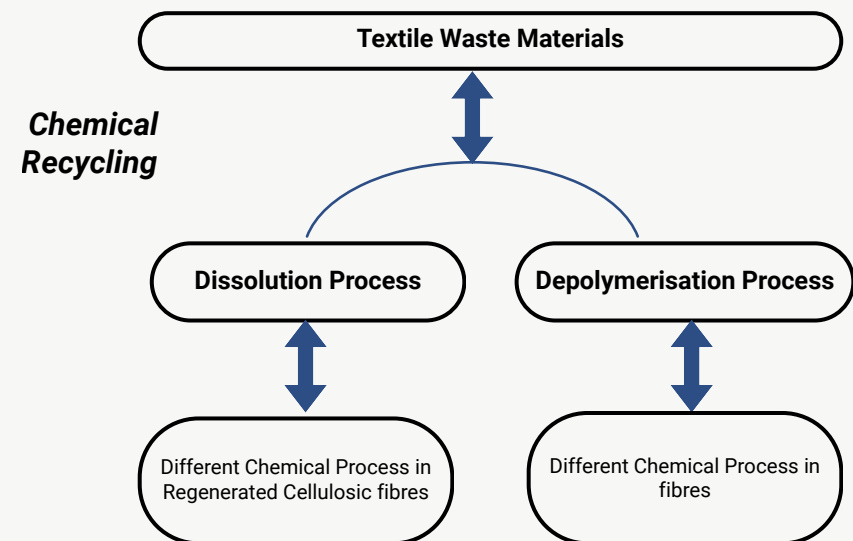
2.4.5 CHEMICAL TEXTILE WASTE RECYCLING

Chemical Recycling – Unlocking Value from Complex Waste

Chemical recycling is the process of breaking down textile waste (blended fabrics, synthetics) into their basic chemical components using solvents, enzymes, or thermal depolymerisation, enabling recovery of pure raw materials that can be regenerated into high-quality fibres.

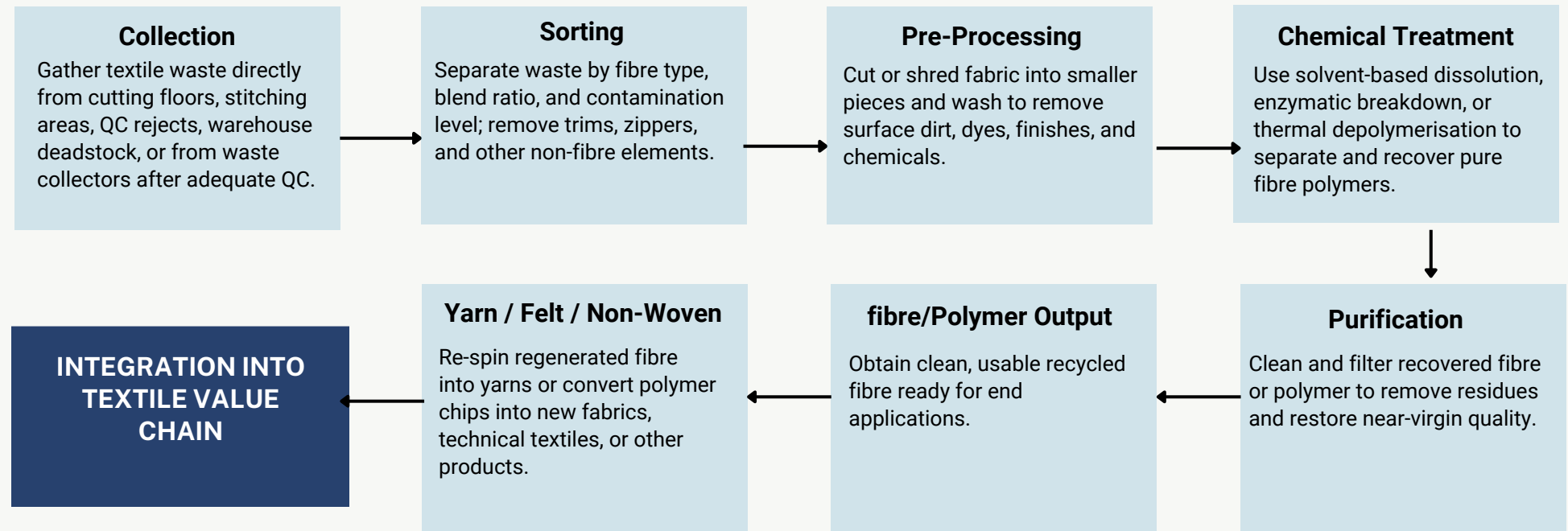
Common Outputs

- **Regenerated Polyester Fibre** - From poly-cotton blends or pure polyester fabrics.
- **Cellulose Pulp** - Extracted from cotton or viscose blends, used to produce viscose, lyocell, or other man-made cellulosic fibres.
- **High-Quality Cotton Fibre** - Near-virgin quality fibre from chemically treated cotton textiles.
- **Specialty Polymer Chips** - For spinning new filament yarn or making non-textile products.



Adapted from Guru et al (2025), Perspective Chapter: Functional Applications in Textile Reuse and Recycling -Enhancing Sustainability and Reducing Environmental Impact

How Chemical Recycling Works – Step by Step



Linkages to Chemical Recycling: Challenges and Opportunities



Common Challenges

- *Limited Access in India*
- *High Capital & Compliance Needs*
- *Sorting Precision*
- *Partnership Dependence*
- *Chemical Safety & Training*

Practical Solutions



- *Leverage External Facilities*
- *Cluster-Level Collaboration*
- *Use guidebook Sorting Guides*
- *Co-Invest with Buyers*
- *Capacity Building*



Opportunities for MSMEs

- *Partnerships with Recyclers*
- *Participation in Pilot Projects*
- *Co-Funding with Buyers*
- *Cluster-Level Infrastructure*
- *Traceable Collection Systems*

Benefits for MSMEs



- *Solution for Complex Waste*
- *High-Quality Output*
- *Access to Premium Markets*
- *Regulatory Alignment*
- *Sustainability Branding*

2.4.6 SCALING TEXTILE WASTE RECYCLING

Scaling Challenges

Collection & Segregation	Infrastructure Gaps	Economics	Quality & Standards	Informal Sector Dominance	Policy & Enforcement Issues
• No source-level segregation in factories or post-consumer collection. • No standard sorting for fibre, blends, or colour. • Contaminants (zippers, buttons, trims) hinder recycling. • Low worker awareness on waste segregation.	• Few cluster-level sorting/recycling facilities for MSMEs. • Limited affordable pre-processing/shredding machinery. • Inadequate storage for segregated waste. • No nearby chemical recycling for blended fabrics.	• High transport/logistics costs cut profits. • Recycled fibre price swings cause instability. • Small waste volumes hinder bulk sales. • Low capacity to invest in recycling.	• Variable fibre quality from poor sorting/contamination. • No standard benchmarks for recycled textiles. • Low adoption of certifications (GRS, OEKO-TEX). • Buyers resist premiums on uncertified products.	• Informal networks dominate post-consumer flows. • Little traceability in supply chains. • Inconsistent quality from poor sorting. • Hard to integrate informal workers.	• No producer responsibility framework for textiles. • Weak enforcement of recycling mandates. • No fiscal incentives for MSMEs. • Overlapping policies cause compliance confusion.

Adopting Recycling: Impacts of Increasing Recycled fibre Use

Regulatory Alignment	Environmental Benefits
• Prepares MSMEs for Textile EPR, EU ESPR & DPP rules. • Meets global buyer mandates on minimum recycled content. • Reduces trade risks from non-compliance.	• Saves water by reducing reliance on virgin cotton. • Cuts chemical use and effluent loads for easier water treatment. • Lowers energy use and carbon footprint. • Diverts textile waste from landfills.
Industrial Ecosystem Benefits	Market Differentiation & Finance Access
• Drives recycling hub investments and shared infrastructure (CETPs, ZLD). • Promotes fibre-ID, AI sorting, and chemical recycling technologies. • Encourages formal integration of informal waste workers.	• Opens premium markets for certified recycled textiles (GRS, RCS). • Unlocks green finance, subsidies, and sustainability loans. • Strengthens MSME positioning with buyers seeking circular sourcing.

Scaling Opportunities

Circular Economy Push	Formalizing the Informal Sector	Technological Advancements	Market Demand
• Buyer demand for recycled, traceable products. • Alignment with climate and sustainability goals. • Clusters branded as circular leaders. • Inclusion in rankings and buyer lists.	• Integrating waste pickers into formal recycling. • Training on sorting, safety, and contamination. • Fair pricing and formal contracts. • Certified, traceable material for premium markets.	• AI-based sorting for fibre, blends, and colour. • Affordable tearing/carding machines for MSMEs. • Pilot chemical recycling for blended fabrics in industrial hubs. • Mobile fibre testing for on-site verification.	• Rising domestic demand for recycled products. • New export opportunities via EU/US regulations. • Buyers seeking long-term recycled sourcing. • Premium pricing through global certifications.
Policy Incentives	Local Solutions	Innovation in Business Models	Local and Export Market Linkages
• ZED certification & GIFT scheme benefits. • State subsidies for machinery & infrastructure. • EPR framework to support traceable recycling. • Green finance via loans & grants.	• Common Facility Centres for shared recycling. • Local sorting, baling & collection hubs. • Lower transport costs via near-source processing. • Stronger intra-cluster waste supply chains.	• Brand take-back schemes for garment recycling. • Recycled-content lines for niche markets. • Subscription models for reuse & repair. • NGO partnerships for upcycled fashion.	• Partnerships with domestic buyers for recycled fibre. • Direct links with global buyers of certified textiles. • Trade fair participation for sustainable products. • Export consortiums for large recycled orders.

2.4.7 Reflections from the Ground

Textile Recycling Landscape

- 1 Batch-Based Recycling:** Batches, sorted by colour and fibre content assists in reduces costs and eliminates the need for dyes. However, it requires large volumes of consistent waste, which is challenging to secure.
- 2 Imported Textile Waste:** Larger clusters like Panipat receive huge quantities of imported textile waste (access to high quality waste supply) leading to little focus on post consumer waste. Additionally, waste pickers and small aggregators work with pre-consumer waste generated locally.
- 3 Informal Sorting Ecosystems:** Knowledge of fibre types, blends, and contaminants remains tacit and undocumented.
- 4 Basic Machinery Landscape:** Panipat's recycling units largely operate with low-cost, semi-mechanised equipment, enabling affordable production but limiting efficiency and quality control. Clusters requires accessible, medium-scale machinery to improve precision, reduce residues, and strengthen in-house recycling systems like Erode with local Open End machines.
- 5 Mismatch in Quality vs. Price:** Brands want recycled yarns that match virgin quality but are unwilling to absorb higher costs, putting recyclers in a no-win market trap.
- 6 Rigid Brand Standards:** Brands have strict expectations around colour shade accuracy and yarn consistency, which recycled yarn producers struggle to meet due to input variability.

2.4.8 CASE STUDIES

Mechanical Recycling - HSN Ecotex

Operates in Panipat as a major recycled yarn producer, converting textile waste into new fibres. Uses a structured process of shredding → cleaning → re-spinning to transform pre- and post-consumer textile waste. Supplies recycled yarns for blankets, carpets, and other textile products in domestic and export markets.

Key Circular Practices:

- Invests in modern sorting and shredding technology for consistent fibre recovery.
- Ensures quality through standardised recycling protocols and spinning machinery.
- Reduces environmental footprint by diverting large volumes of textile waste from landfills into production cycles.

Click Here To Know More : <https://kakkarspinning.com/>

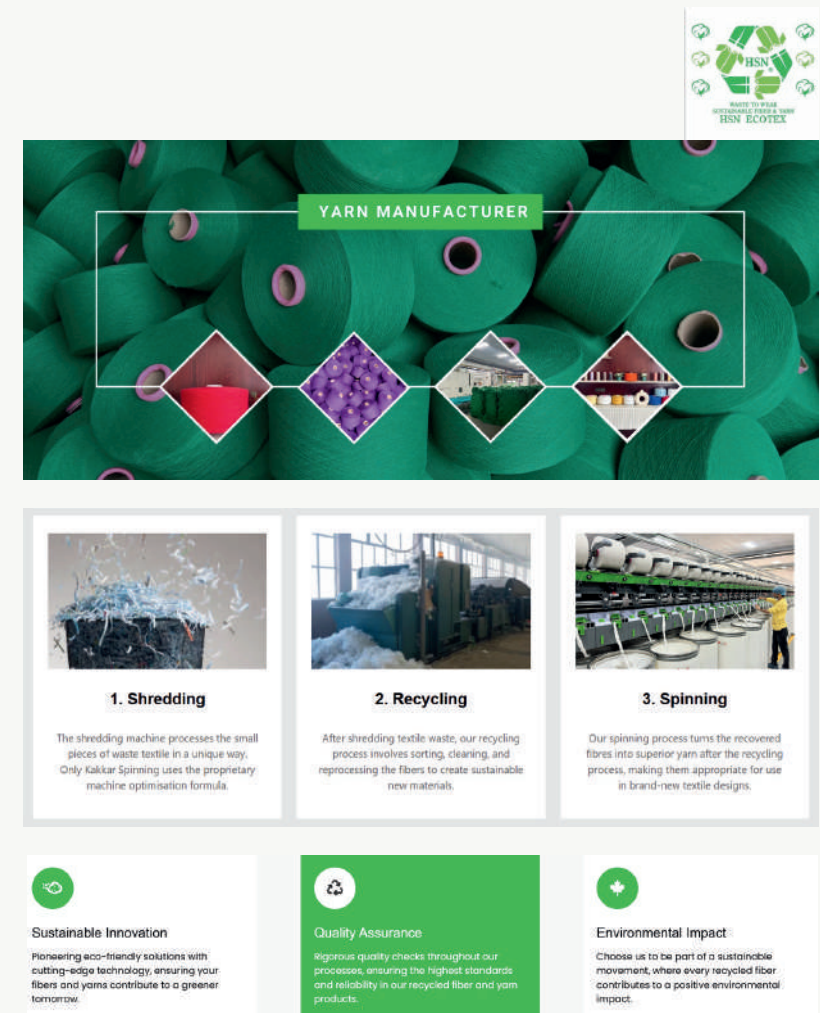


Image Source @HSN Ecotex

Chemical Recycling - Circ

Circ has developed a hydrothermal recycling process that separates polyester and cellulose from blended textile waste (including polycotton). The process breaks down fibres into polyester monomers (TPA, MEG) and cellulose pulp, which can be regenerated into virgin-equivalent fibres.

They enable recycling of complex blended fabrics, a major challenge for the industry and reducing dependence on virgin raw materials, closing material loops.

Outputs:

- Lyocell pulp → spun into staple or filament fibres for textiles.
- Polyester monomers → re-polymerised into new polyester fibres.

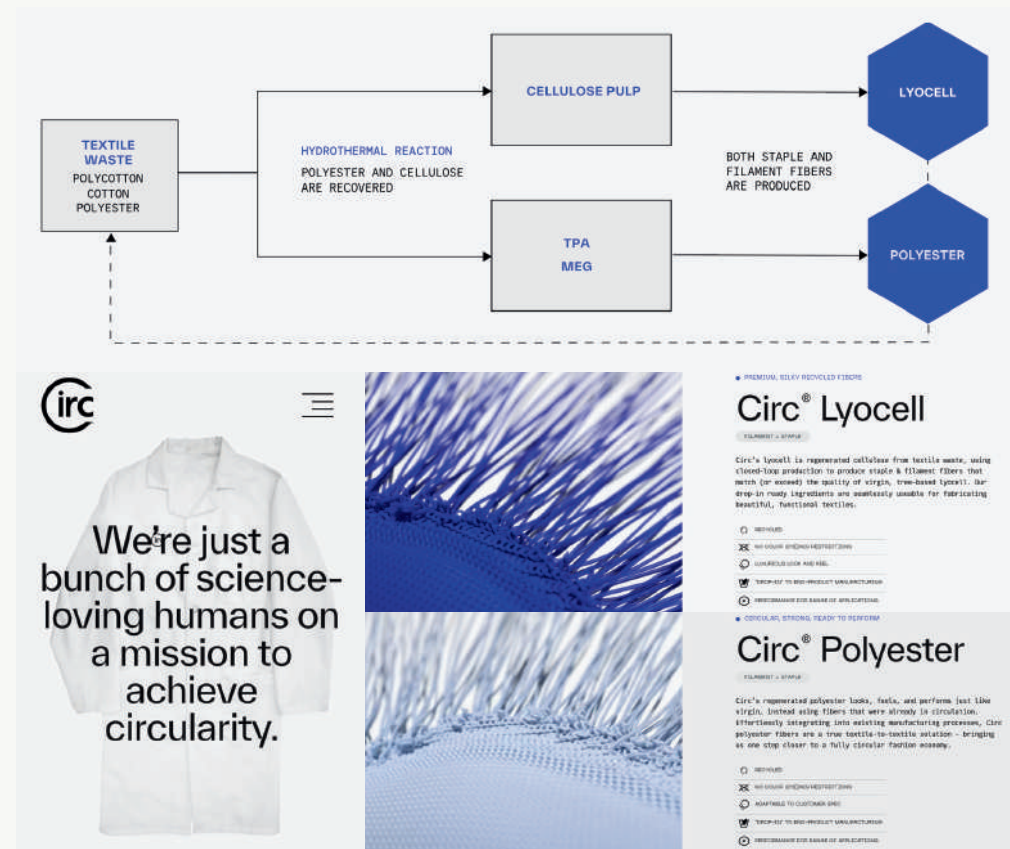


Image Source @Circ

Click Here To Know More : [Circ Earth](https://www.circ-earth.com/)

Chemical Recycling - Circulose

CIRCULOSE® makes fashion circular by creating material made by recovering cellulose from worn-out clothes and production scraps. They replace the use of virgin materials such as wood pulp or cotton and helps to close the loop on textile production.

CIRCULOSE® takes cotton-rich textile waste, does some mechanical pre-processing (sorting/shredding), then chemically dissolves and purifies the cellulose to make dissolving pulp used for viscose/lyocell/modal. The core recycling step is chemical, not mechanical. These fibres are spun into yarns, made into fabrics, and crafted into new, high-quality garments—enabling true fibre-to-fibre circularity.

Circular Process – How Circulose® Works

- Collection of discarded garments and production waste
- Preparation through shredding, stripping disruptors, and removing non-cellulosic materials
- Regeneration through processing into a pulp, dried into sheets
- Re-spinning by fibre manufacturers into new, virgin-quality textile fibres.
- Circular use by brands and designers into new garments

Click Here To Know More : [Circulose](#)



Image Source @Circulose



2.5 Circular Transition for MSME Sector

2.5 CIRCULAR TRANSITION FOR MSME SECTOR

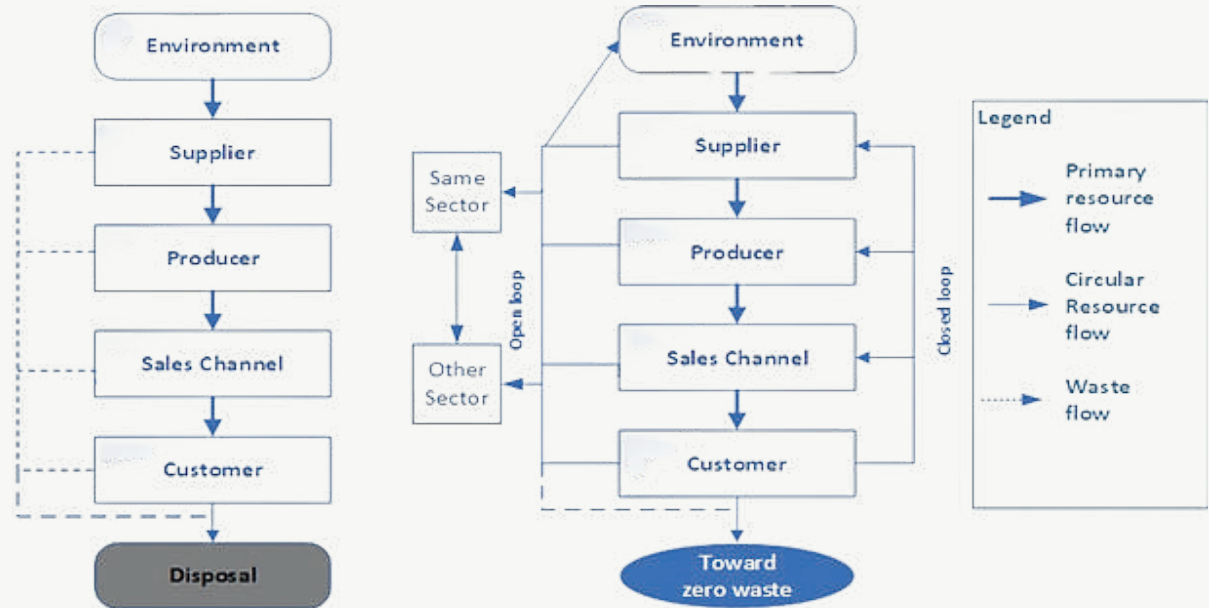
<i>2.5.1. Circular Supply Chain Management (C-SCM)</i>	<i>133</i>
<i>2.5.2. 'Circular Design' & 'Design for End of Life' (EoL)</i>	<i>140</i>
<i>2.5.3. Circular Business Models across the Supply Chain.....</i>	<i>148</i>
<i>2.5.4. Case Studies</i>	<i>151</i>
<i>2.5.5. Reflections from the Ground.....</i>	<i>153</i>
<i>2.5.6. Additional Readings and Resources.....</i>	<i>154</i>

2.5.1 CIRCULAR SUPPLY CHAIN MANAGEMENT (C-SCM)

Transforming and Redefining Sustainability

Circular Supply Chain Management designs, sources, produces, distributes, collects, and recovers products so materials stay in use at their highest value, for as long as possible.

It integrates forward flows (**make-move-sell**) with reverse flows (**return-repair-reuse-remanufacture-recycle**), targeting waste prevention, resource productivity, and closed loops.



Linear Supply Chain

Circular Supply Chain

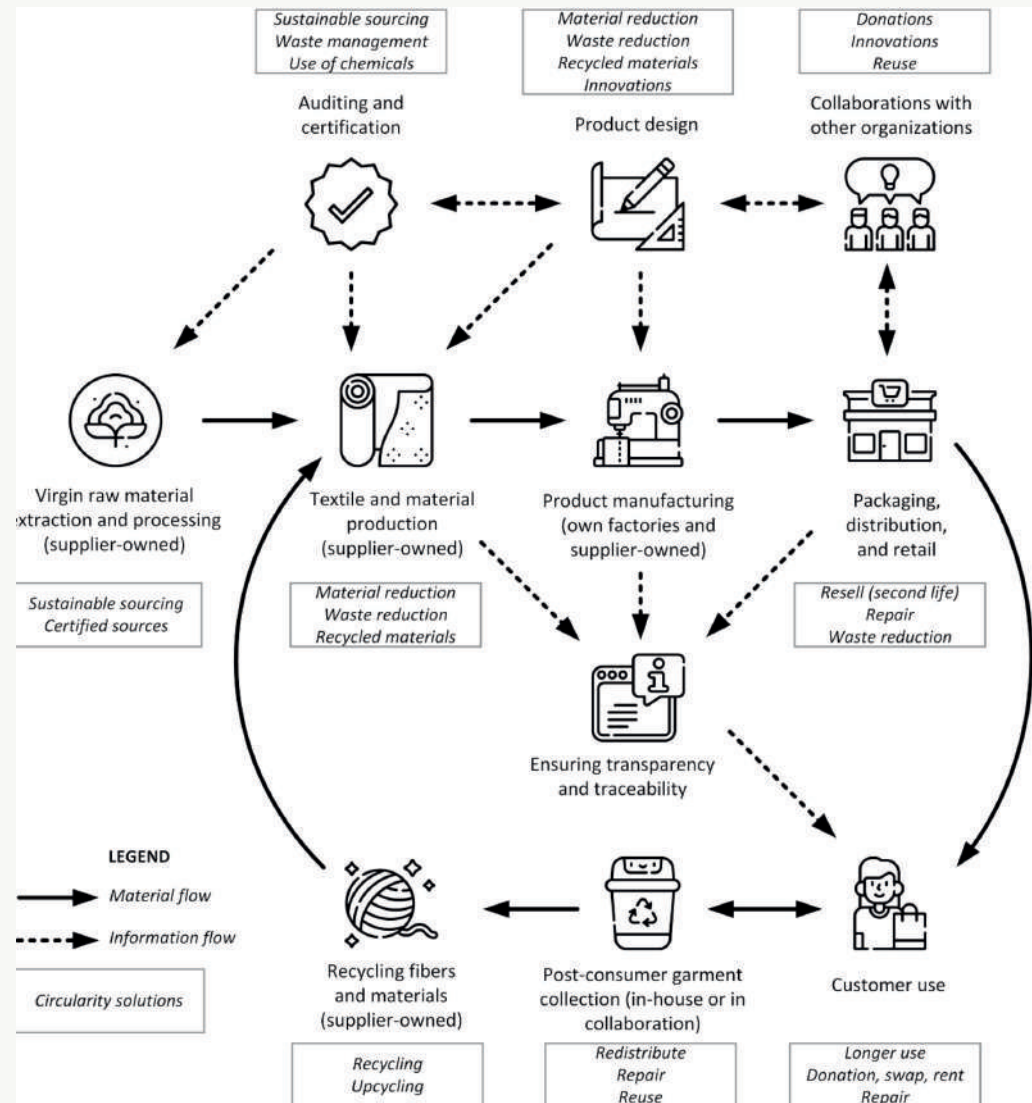
Farooque et al (2019), Circular supply chain management: A definition and structured literature review, <https://doi.org/10.1016/j.jclepro.2019.04.303>

Creating Closed Loops Transition

Transitioning to closed-loop systems in textiles means ensuring that materials remain in circulation for as long as possible, instead of being discarded after one use.

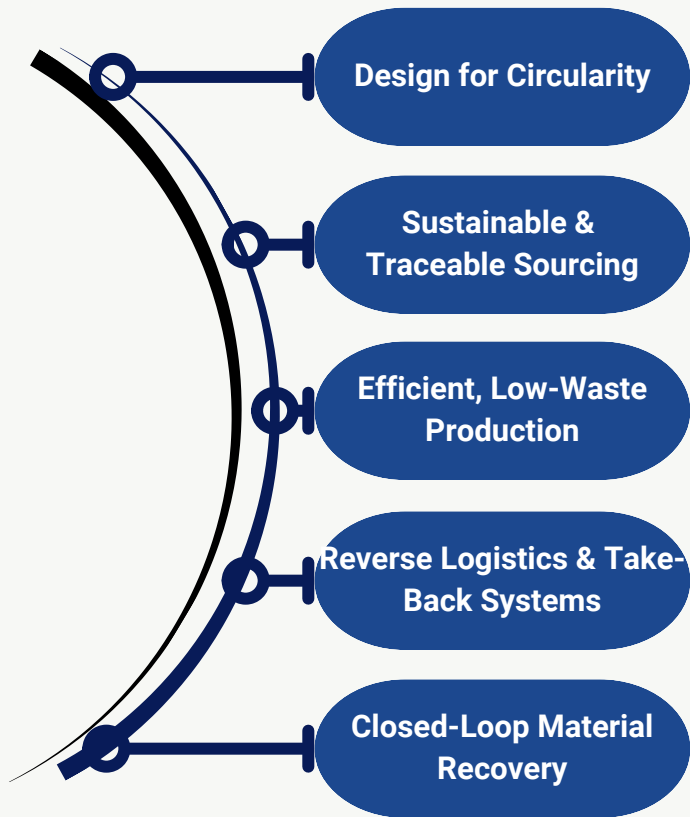
the image highlights how circularity solutions, such as sustainable sourcing, recycled materials, reuse, repair, donations, and collaborations, can be integrated at each step, from raw material extraction to product design, manufacturing, retail, and post-consumer garment collection.

Closed loops are not one single intervention but a system of actions to keep fibres in circulation.



Dragomir and Dimitru, *Practical solutions for circular business models in the fashion industry*,
Source: *Cleaner Logistics and Supply Chain* (2022), DOI: 10.1016/j.clscn.2022.100040

Key Aspects of C-SCM in Textiles



Description	Related 'R' strategies
Develop products, packaging, and components to be durable, repairable, modular, and recyclable, minimising environmental impact from the outset.	Rethink; Refuse; Reduce; Repair; Refurbish; Remanufacture
Source raw materials ethically and sustainably, ensuring transparency and traceability across the entire supply chain.	Refuse; Reduce; Rethink
Reduce energy, water, and raw material use while cutting waste generation and process inefficiencies.	Rethink; Reduce; Reuse; Repurpose
Create systems to collect, transport, and process used products, packaging, or materials for reintegration into the supply chain.	Reuse; Repair; Refurbish; Remanufacture; Recycle
Designing and operating supply chains so that materials at the end of their life are collected, processed, and fed back into production cycles, instead of being disposed of.	Recycle; Recover; Repurpose

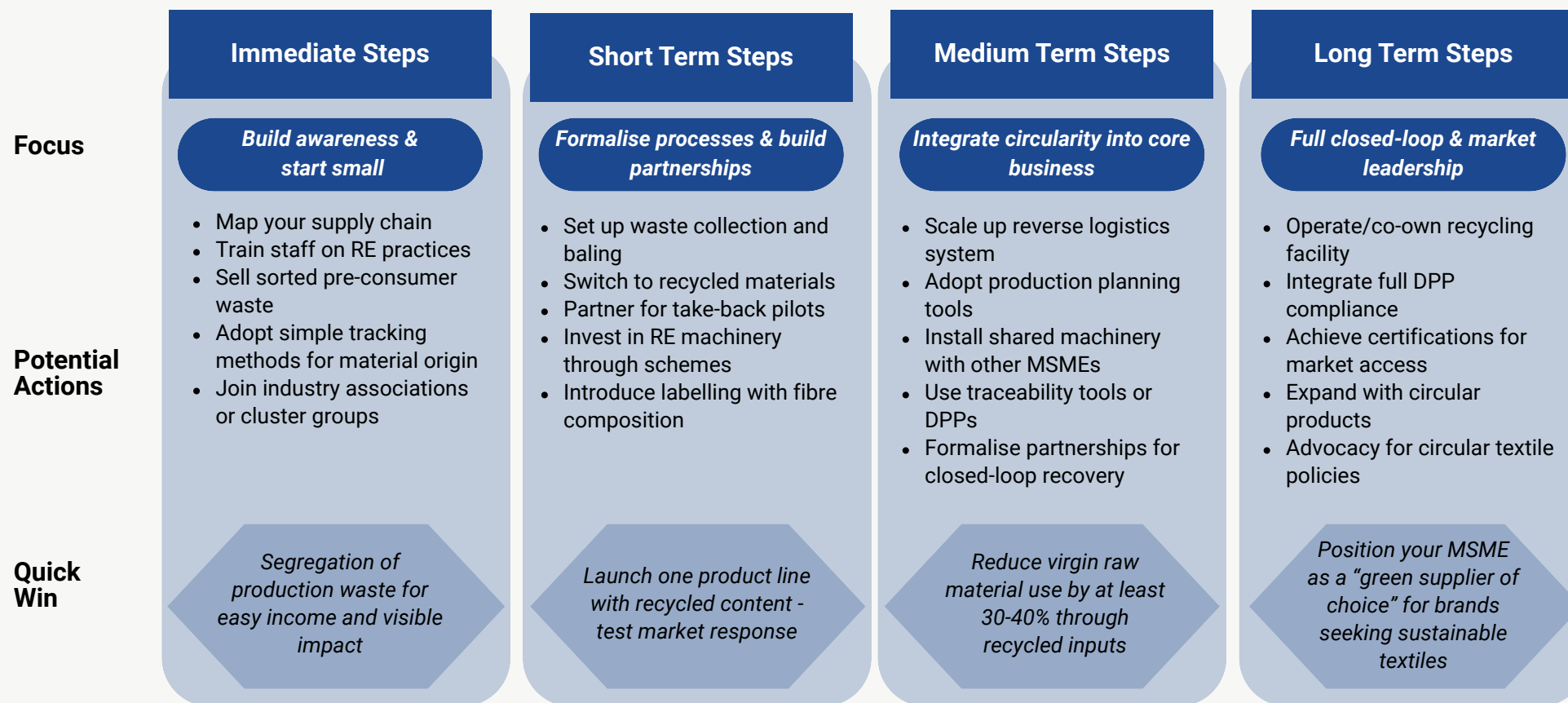
C-SCM for Textile MSMEs - A Collaborative Approach

Key areas where MSMEs must collaborate with buyers, recyclers, and peers to enable circular supply chains

	Reverse Logistics for 'Take-Back'	Material Traceability	Cluster-Level Resource Sharing
Definition	The process of collecting end-of-life textiles from customers or buyers and moving them back through the supply chain for reuse, repair, or recycling.	The ability to track and verify the origin, composition, and processing history of a textile product across the supply chain.	A collaborative model where MSMEs in the same textile hub share infrastructure, technology, and services to reduce costs and increase efficiency.
Action Items	• Partner with buyers, retailers, or NGOs to run bulk garment take-back schemes • Use simple grading methods for reuse, repair, or recycling • Align design choices with recyclers' capabilities	• Attach labels or QR codes for easy identification of supply chain • Keep batch records, certifications, and proofs • Begin with basic traceability tools (QR codes, batch records) before transitioning to full DPP systems	• Pool resources with MSMEs for common sorting, shredding, and baling facilities • Share access to expensive machinery through Common Facility Centres • Collaborate on bulk procurement for cost and quality

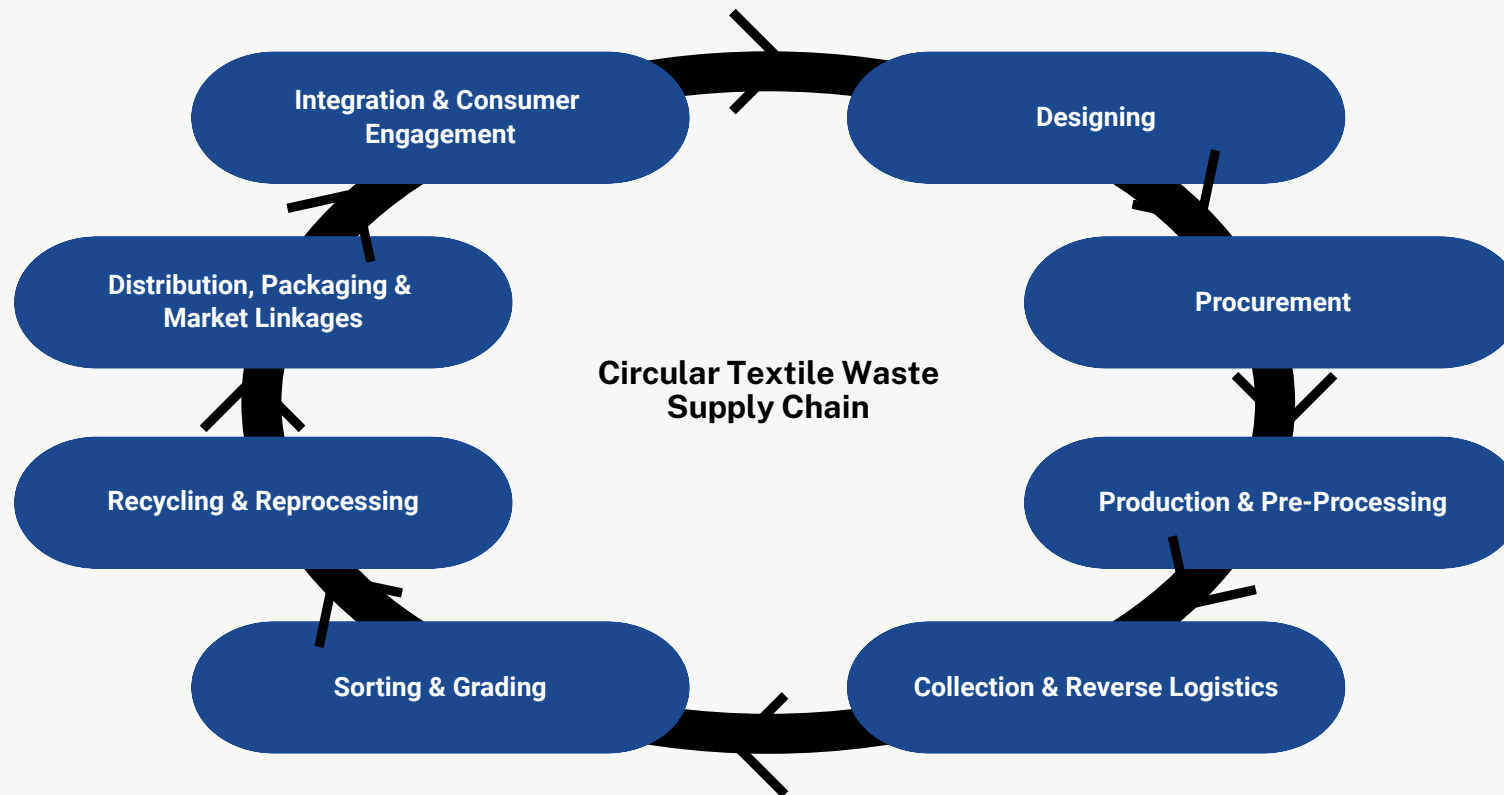
Roadmap towards a Circular Supply Chain for MSMEs

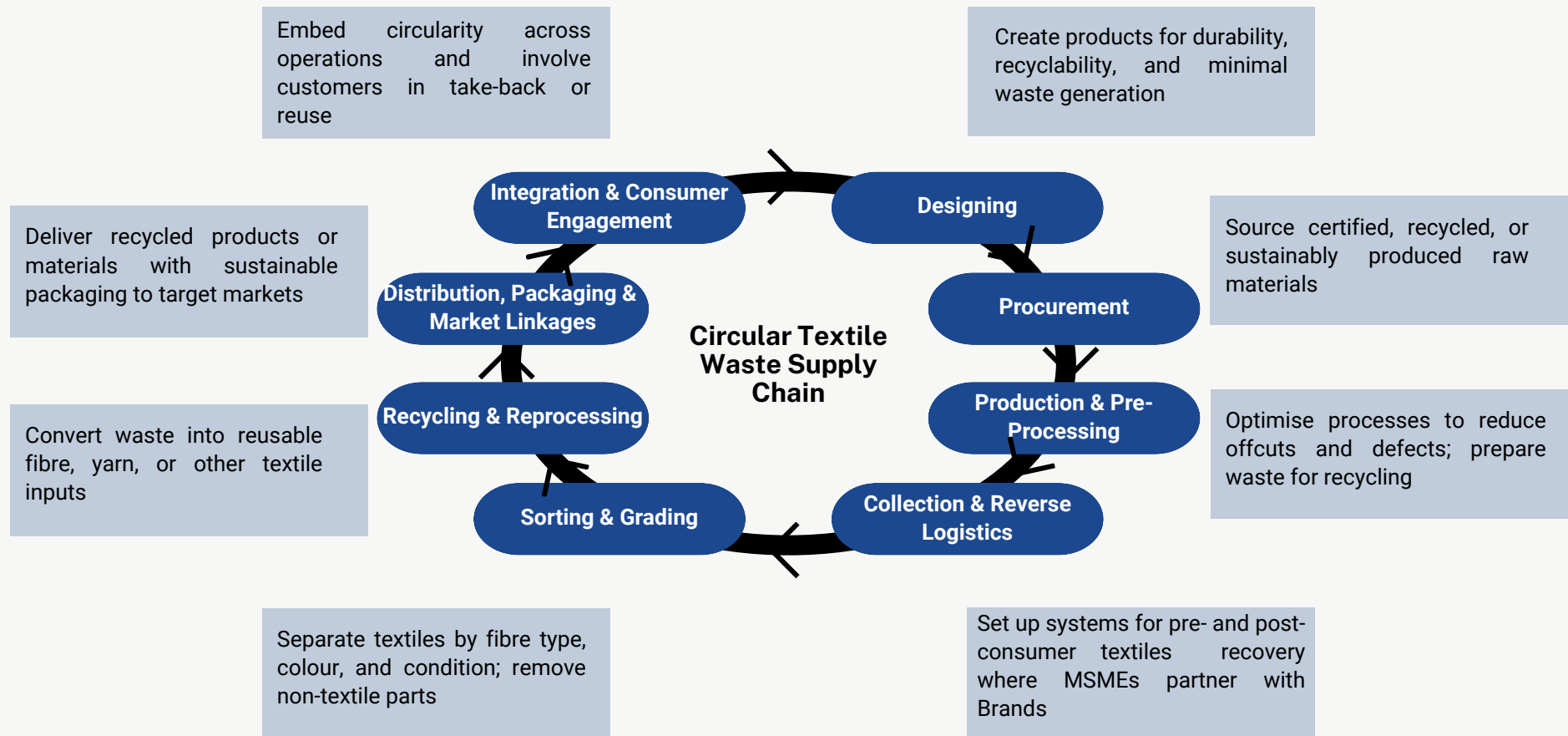
A practical roadmap showing what MSMEs can do immediately, in the short, medium, and long term



System Flow: Building a Circular Textile Waste Supply Chain

The full system view on how all steps connect to form an efficient closed-loop supply chain





2.5.2 'CIRCULAR DESIGN' & 'DESIGN FOR END OF LIFE' (EOL)

What is Designing for Circularity and EOL

"Circular design is a creative approach that minimises waste and pollution by keeping products and materials in use for as long as possible, while regenerating natural systems."

- Ellen MacArthur Foundation, 2020

Design for End of Life (EoL) refers to designing products, services, or systems with consideration for their eventual disposal, reuse, or repurposing. It's a strategy that aims to minimise waste, reduce environmental impact, and optimise resource utilisation throughout the product's entire lifecycle, including its end-of-life phase. This approach encourages designers to think about EoL scenarios early in the design process, exploring options like disassembly, recycling, remanufacturing, or even designing for a second life.



Mono-material construction (Source: WRAP)

‘Circular Design’: Understanding a Circular System

Principles of Circular Design

Design for Longevity

Designing products to last longer through durable design and materials.

Design for Resource Efficiency

Minimizing the use of fabric, water, chemicals, and energy in production.

Design for Repairability

Making products easy to fix by replacing worn-out or broken components.

Design for Disassembly

Designing products so materials can be separated at end-of-life for reuse or recycling.

Design for Recyclability

Choosing materials and processes that allow fibres to be recovered and reused.

Design for Adaptability

Designing products that can be modified, are resizable, or can be repurposed for extended use.

Aspects under each principal of circular design

- Material Quality
- Manufacturing Quality
- Design Style
- Functionality

- Fabric Utilisation
- Process Efficiency
- Material Sourcing
- Production Planning

- Component Design
- Production Method
- Accessibility
- Design Support

- Assembly inputs
- Material Separation
- Assembly Method
- Labeling

- fibre Composition
- Chemical Safety
- Fabric Identification
- Compatibility

- Size Adjustment
- Multi-functionality
- Modular Parts
- Design Flexibility



Designed for Longevity: Example of an Indian Sari that is made for long years of use, often passed down generationally.

Image Source:
<https://www.indiamart.com/proddetail/banarsi-pure-kataan-silk-saree-2855286627030.html>



Source: WRAP

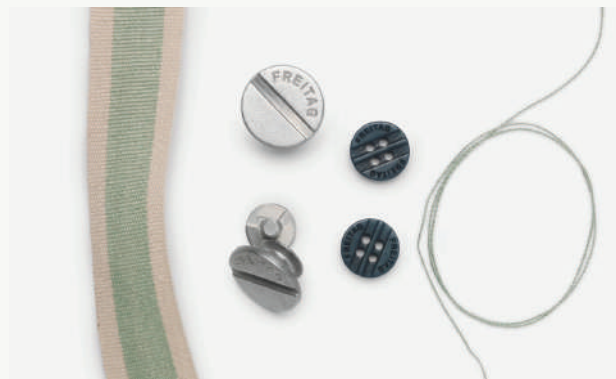
Homogeneous components

One of the essential considerations of cradle-to-cradle design is the necessity to utilise homogeneous fabrics and components, in order to facilitate reuse and recycling without downgrading the materials and products.

Many of the designers exploring this way of working highlight the challenges as sourcing suitable fabrics and components, such as zips, buttons and sewing threads.

Puma's recyclable Track Jacket as part of the InCycle collection, is 98% made of recycled polyester, with the zip also made of recyclable polyester to enable the cradle-to-cradle recycling process, which sees the components of the jacket turned back into polyester granulate in order to serve as a secondary raw material for other products made of recycled polyester.

Designed for Recyclability



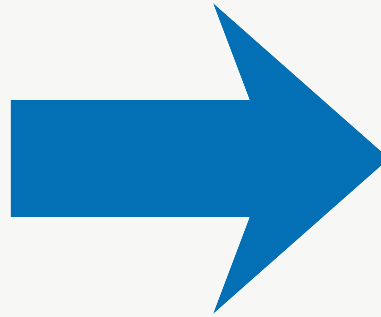
Designed for Disassembly: Easing attaching / detaching of disruptors.

Swedish accessories brand **Freitag**, in 2015 launched a line of compostable workwear featuring metal buttons that could be unscrewed and removed from the garment easily, allowing them to be collected and used again, and again. Using the same fastener throughout and making them easy to remove (screws are faster than nuts and bolts) aids disassembly.

‘Circular Design’ for MSMEs: Understanding a Circular System

ASPECTS TO KNOW ABOUT

- 1. Material Quality & Selection**
- 2. Sustainable Sourcing**
- 3. fibre Preparation Efficiency**
- 4. Fabric Structure for Longevity**
- 5. Chemical Use in Processing**
- 6. Waste Minimisation in Production**
- 7. Ease of Repair & Disassembly**
- 8. Packaging & Transport**
- 9. Product Usability & Lifespan**
- 10. Post-Use Collection Systems**
- 11. Material Identification & Recovery**



THINGS TO CONSIDER

- 1. Stage of Textile Value Chain**
- 2. Examples of Traditional Design**
- 3. Examples of Circular Design**
- 4. Benefits to MSMEs**
- 5. Relevant Tools / Schemes**
- 6. Quick Win Tips**

This section guides MSMEs in applying circular design principles across the textile value chain, from material sourcing and production to product use and recovery. It outlines key aspects and practical considerations that help transform traditional linear processes into circular, resource-efficient systems.

THINGS TO CONSIDER	Material Quality & Selection	Sustainable Sourcing	Fibre Preparation Efficiency
Stage of Textile Value Chain	Raw Material Production / Processing.	Sourcing / fibre Preparation.	Yarn Preparation / Spinning.
Examples of Traditional Design	Using low-cost polyester-cotton blends for uniforms that wear out quickly.	Buying cheapest yarn from uncertified suppliers.	Operating old spinning frames with high power use and high waste.
Examples of Circular Design	Choosing 100% organic cotton for uniforms, lasting twice as long.	Sourcing GRS-certified recycled polyester yarn from local mills.	Upgrading to energy-efficient spinning frames, reducing waste by 15%.
Benefits to MSMEs	Higher product value, fewer returns, better buyer trust.	Access to export buyers with sustainability criteria.	Reduced power bills, less raw material waste.
Relevant Tools / Schemes	GRS, OEKO-TEX®, Fairtrade Cotton, ZED Certification.	State textile policy incentives for sustainable sourcing.	GIFT Scheme for efficient machinery.
Quick Win Tips	Start with one product line using certified sustainable fabric.	Map 2–3 local certified suppliers and trial bulk orders.	Maintain and calibrate spinning machines regularly to cut waste.

THINGS TO CONSIDER	Fabric Structure for Longevity	Chemical Use in Processing	Waste Minimisation in Production
Stage of Textile Value Chain	Weaving / Knitting / Bonding.	Bleaching / Dyeing / Finishing.	Manufacturing / Assembly.
Examples of Traditional Design	Loosely woven fabrics for bedsheets that fray quickly.	Using azo dyes with heavy water pollution in denim finishing.	12% cutting waste discarded in landfill.
Examples of Circular Design	Tightly woven mono-material fabrics for high tear resistance.	Using low-impact indigo dyeing with water recycling.	Using CAD based technologies that optimise / minimise waste generation during production
Benefits to MSMEs	Extended product lifespan, repeat customers.	Lower effluent treatment costs, easier compliance.	Extra income from selling offcuts.
Relevant Tools / Schemes	BIS standards for fabric strength.	ZLD Policy incentives, CETP access.	MSME Cluster Development Program for waste valorisation.
Quick Win Tips	Shift to tighter weave settings without major retooling.	Trial low-impact dyes on 1–2 product lines.	Segregate cutting waste daily and store for bulk sale.

THINGS TO CONSIDER	Ease of Repair & Disassembly	Packaging & Transport	Product Usability & Lifespan
Stage of Textile Value Chain	Manufacturing / Assembly.	Distribution / Trade / Retail.	Consumption / Use.
Examples of Traditional Design	Permanently stitched trims and zippers.	Garments in single-use polybags for export.	No care instructions, garments wear out early.
Examples of Circular Design	Detachable trims and replaceable zippers.	Reusable cloth bags or recycled paper bands for packing.	Wash-care labels provided to extend lifespan.
Benefits to MSMEs	Strengthens customer loyalty and resale market.	Lower packaging costs, reduced waste.	Brand reputation for durability.
Relevant Tools / Schemes	BIS repairability guidelines (draft), Fair Trade standards.	EPR guidelines for packaging waste.	Eco-labels for product care.
Quick Win Tips	Switch to detachable zippers and buttons.	Replace virgin plastic bags with recycled LDPE bags.	Print care instructions directly on fabric tags.

THINGS TO CONSIDER	Post-Use Collection Systems	Material Identification & Recovery
Stage of Textile Value Chain	Collection / Sorting.	Material Recovery.
Examples of Traditional Design	Discarded clothes sent to landfill via municipal waste.	No fibre content labels, making sorting difficult.
Examples of Circular Design	Store take-back program for sorting and recycling.	Stitched fabric tags with fibre composition for recyclers.
Benefits to MSMEs	Creates feedstock for recycling, new revenue streams.	Higher value for recyclers, better market access.
Relevant Tools / Schemes	CSR tie-ups for take-back programs.	Digital Product Passport (DPP) pilots, BIS labeling standards.
Quick Win Tips	Partner with local NGOs for collection drives.	Add fibre composition labels during production.

2.5.3 CIRCULAR BUSINESS MODELS ACROSS THE SUPPLY CHAIN

Redesigning value creation by keeping textiles in use longer.

Circular Business Models (CBMs) are strategies that enable companies to create, deliver, and capture value while keeping products, components, and materials in use for as long as possible.

In textiles, CBMs aim to reduce resource consumption, extend product lifecycles, and close material loops through reuse, repair, recycling, and sustainable input choices.

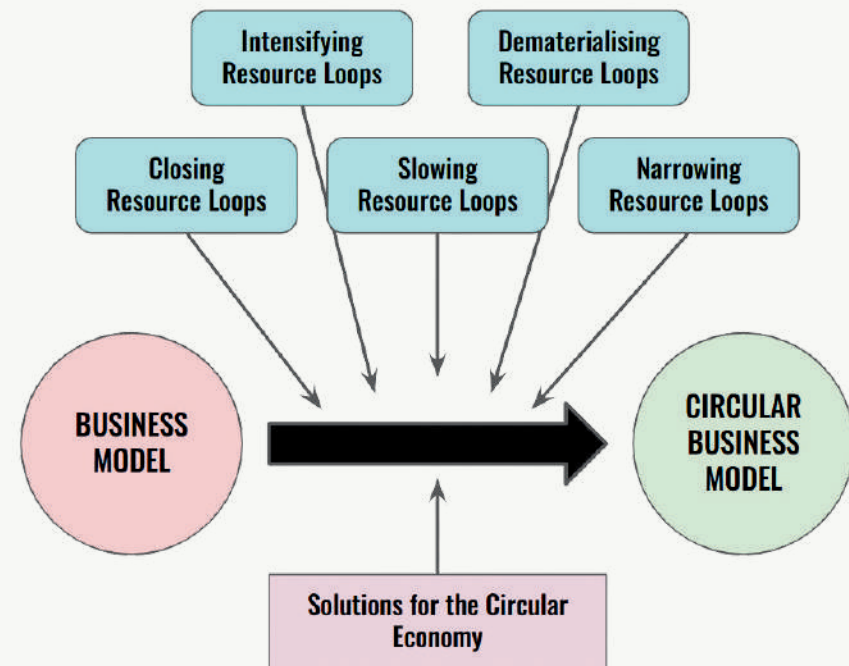
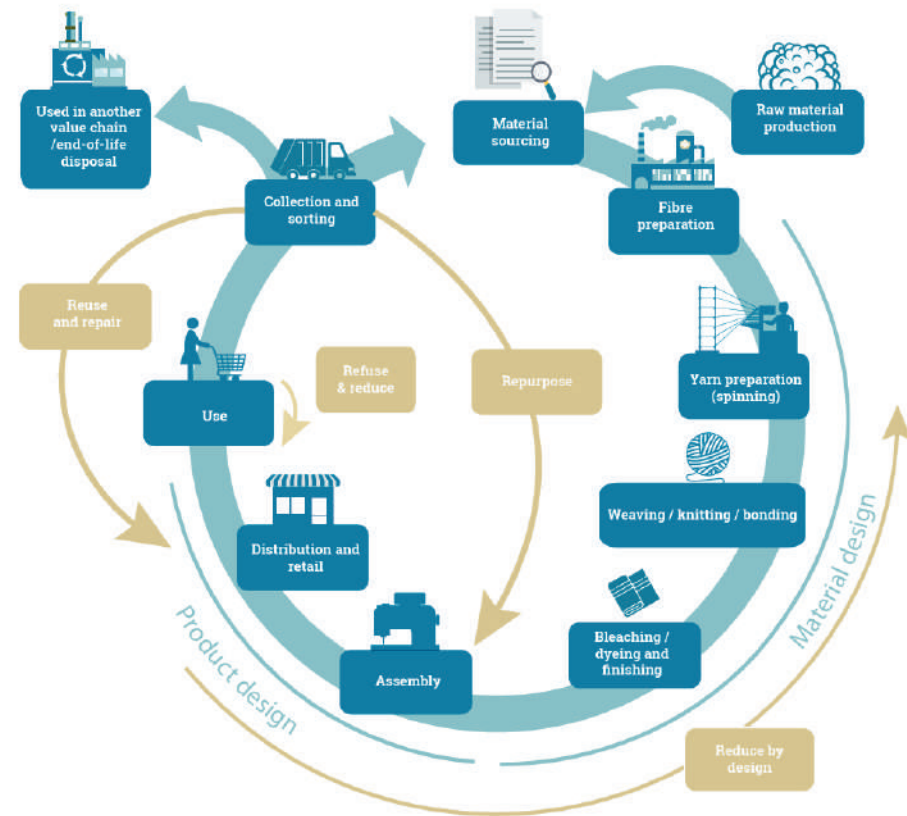


Image Source: Conserve India

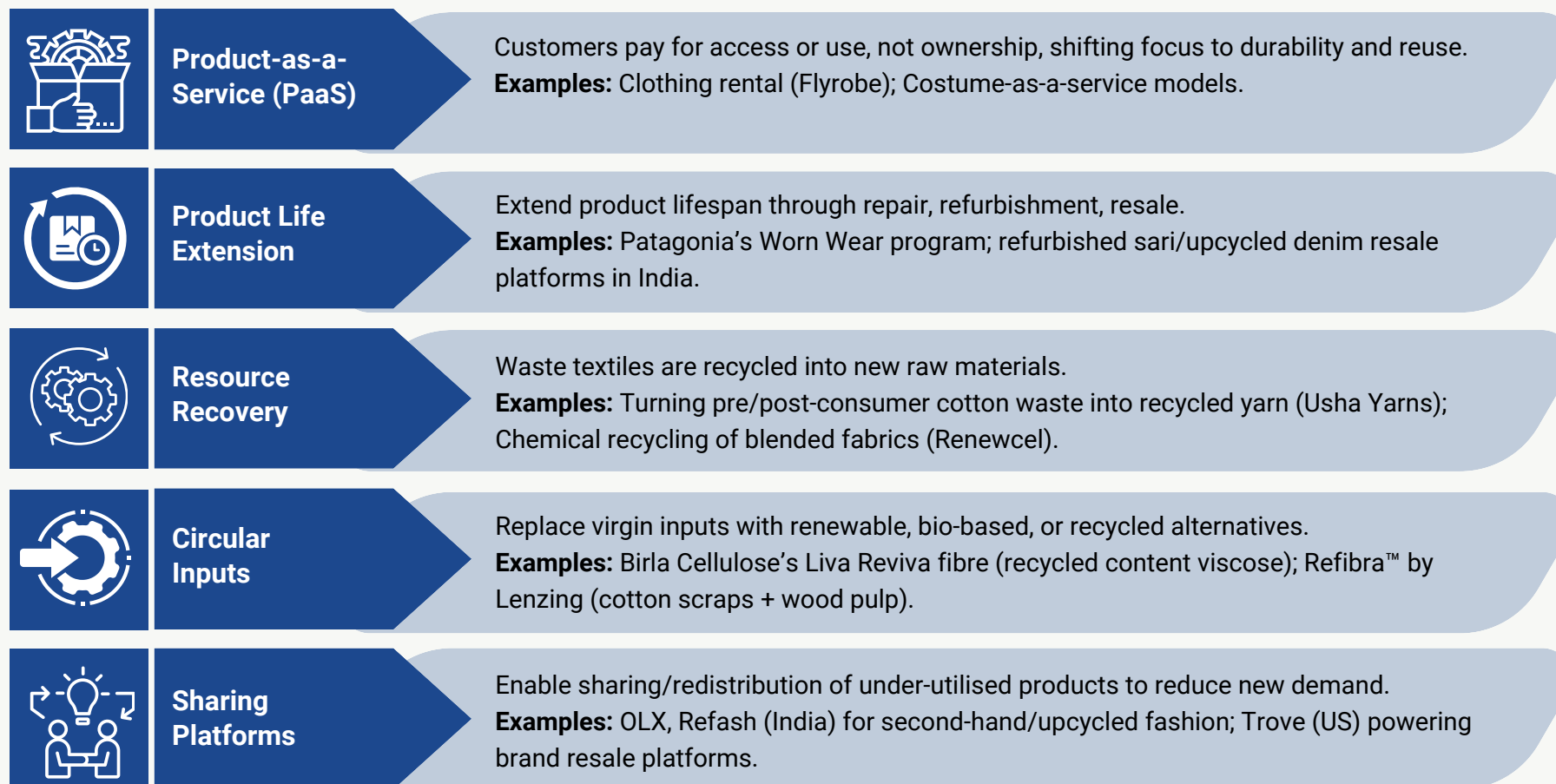
Why Circular Business Models

	Turn Waste into Worth as a business opportunity
	Create Products That Last and Mean Something
	Build climate resilience in your business
	Unlock new markets and revenue streams
	Future-Proof Your Brand from changing regulations
	Create livelihoods, Restore crafts, & Protect Ecosystem



Source: UNEP (2019). Circularity Platform.

Business models that keep textiles in use and materials in the loop



2.5.4 CASE STUDIES

Pōsh Bag - Circular Supply Chain in Baramulla

Pōsh Bag, a circular brand created by wasterworkers and artisans working together to create value from waste. Conserve India's intervention in Baramulla, Kashmir helped create a multistakeholder collaboration and provide the skills to create a circular supply chain to these working groups.

Circular Intervention Across the Supply Chain:

- Cleaned Textile Waste Supply Chain
- R Intervention for Textile Waste Stream
- Artisan-Led Sustainable Production Practices

Collaborations

Indian Army; District Administration; Chinari Yuva Centre; HDFC Bank; and Conserve India.

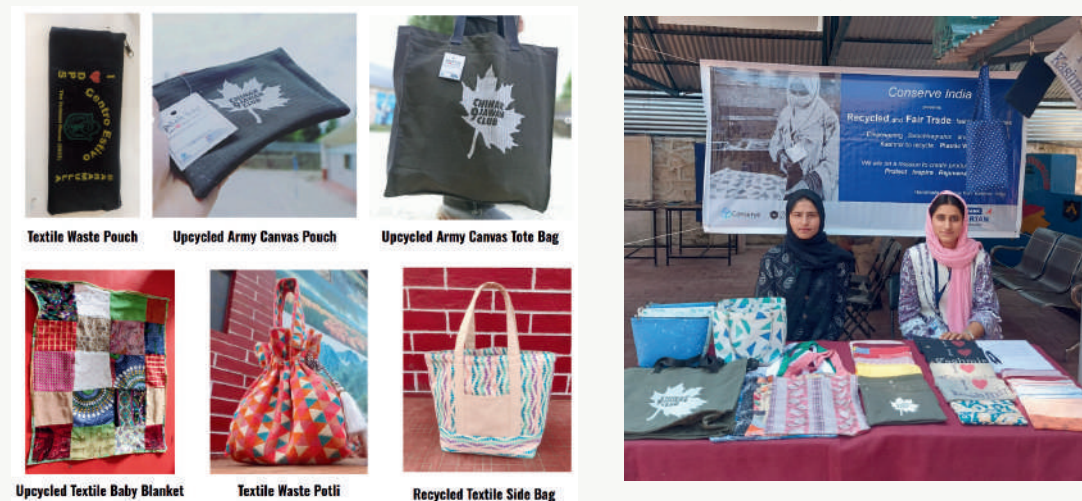
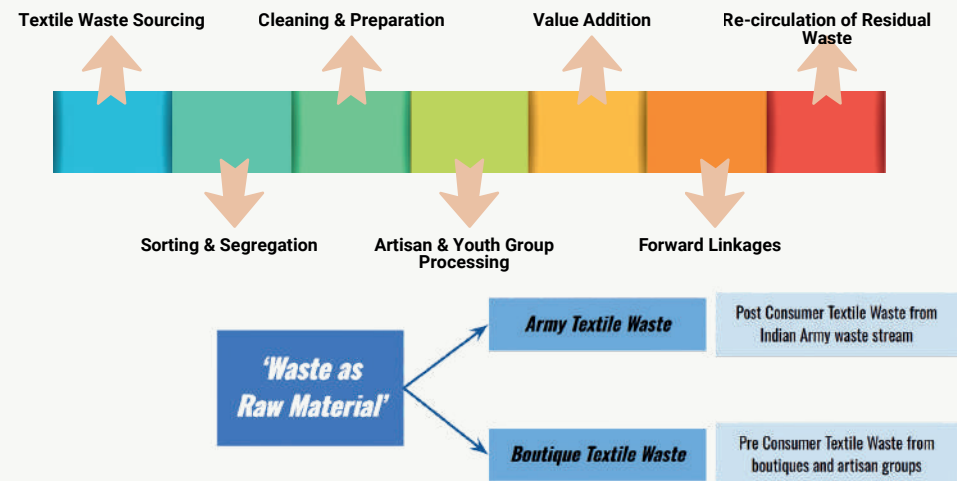


Image Source: Conserve India

Click Here To Know More : [@poshbagkashmir](https://www.instagram.com/poshbagkashmir) (Pōsh Bag)

Circular Supply Chain Directory

Directory of Sustainable value chain suppliers

This directory facilitates the discovery of value chain suppliers that help brands become more sustainable. Resources ranging from Fabric Manufacturers and Recyclers to Packaging Experts, Certifications and more, are available to access. SU.RE Sustainable Supply Chain Directory is a Collaborative initiative with CEE & GATS.

- Responsible Manufacturing
- Technology & Innovation
- NGOs & Social Impact
- Printing & Dyeing
- Recycling & Upcycling
- Packaging Solutions
- Textiles
- Renewable Energy
- Certification
- Ecosystem Enablers
- Other

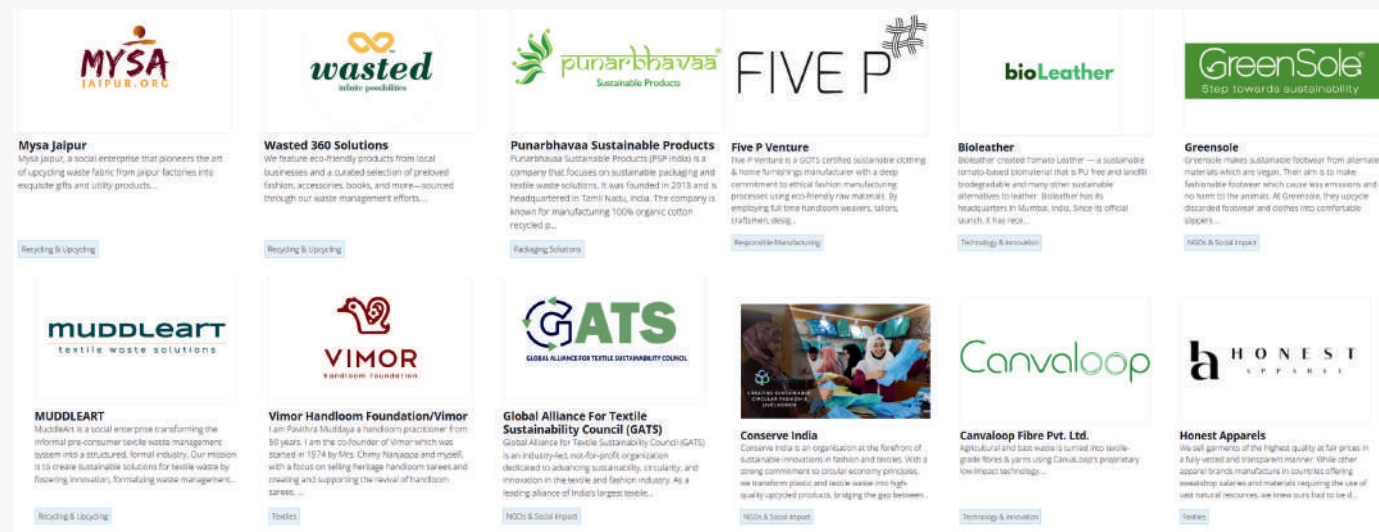


Image Source: SU.RE

Click Here To Know More : [SU.RE Supply Chain Directory](#)

2.5.5 REFLECTIONS FROM THE GROUND

Missing Links in Circular Transition

- 1 No Closed-Loop Visibility:** The current system lacks tools to connect pre-consumer waste with post-consumer output, leaving circularity claims vulnerable to scrutiny.
- 2 Design-for-Recyclability is Missing:** There is minimal adoption of mono-material garments, which are easier to recycle. Most products reaching recyclers are complex, multi-component, and hard to process cost-effectively.
- 3 Thin Margins, High Risk:** MSMEs operate on very tight margins. The pressure to remain price-competitive discourages investment in innovation, traceability, or compliance.
- 4 Compliance Disincentives:** The cost of non-compliance is often cheaper than the cost of meeting circularity or sustainability benchmarks, creating a market imbalance.

2.5.6 ADDITIONAL READINGS AND RESOURCES

GIZ Green Business Guide → [Here](#)

WRAP UK Circular Design Guidebook for Fashion and Textiles → [Here](#)

UN ESCAP Policy Guidebook For MSME Development In Asia And The Pacific → [Here](#)

C-SCM Conceptual Performance Measurement Framework → [Here](#)



2.6 Traceability & Digital Product Passport

2.6 TRACEABILITY AND DIGITAL PRODUCT PASSPORT

2.6.1. Traceability and Digital Product Passport (DPP).....	157
2.6.2. Digital Product Passport (DPP): Overview	158
2.6.3. DPP: Core Components and Data Fields.....	159
2.6.4. Implementation Steps for MSMEs	161
2.6.5. Textile Waste Recycling & Digital Product Passport.....	162
2.6.6. Data Sheet and Templates.....	163
2.6.7. Cluster Level Use Case.....	165
2.6.8. Reflections from the Ground.....	166
2.6.9. Case Study.....	167
2.6.10. Case Study.....	170
2.6.11. Additional Readings and Resources.....	171

2.6.1 TRACEABILITY AND DIGITAL PRODUCT PASSPORT (DPP)

Relevance of Traceability in the Textile Sector

Traceability is the ability to track a textile product's journey – from raw material source through every stage of manufacturing, distribution, use, and end-of-life – using verified, recorded information.

It covers:

- **Material origin** – Where and how fibres were sourced (e.g., cotton farm, recycled yarn supplier).
- **Processing stages** – Which facilities spun, dyed, finished, or stitched the product.
- **Environmental & social data** – Energy, water, chemicals used; labour compliance.
- **End-of-life pathway** – Whether the product can be reused, recycled, or safely disposed.

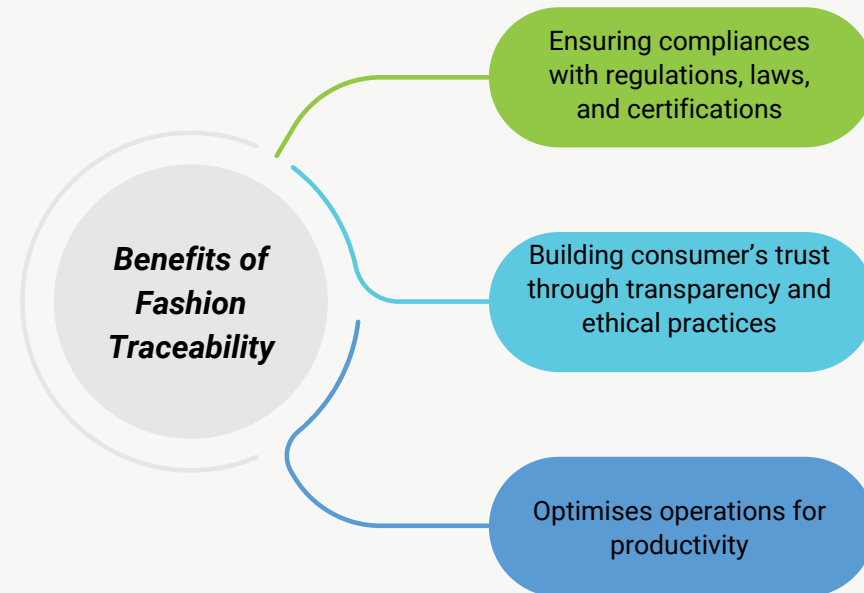


Image Source: Conserve India

2.6.2 DIGITAL PRODUCT PASSPORT (DPP): OVERVIEW

Digital Product Passport (DPP) is an upcoming regulatory requirement that aims to document and share key information about a product's origins, materials, and sustainability attributes throughout its lifecycle. In simple terms, a DPP is like a digital Aadhaar or identity card for a product that stays with it from production to end-of-life.

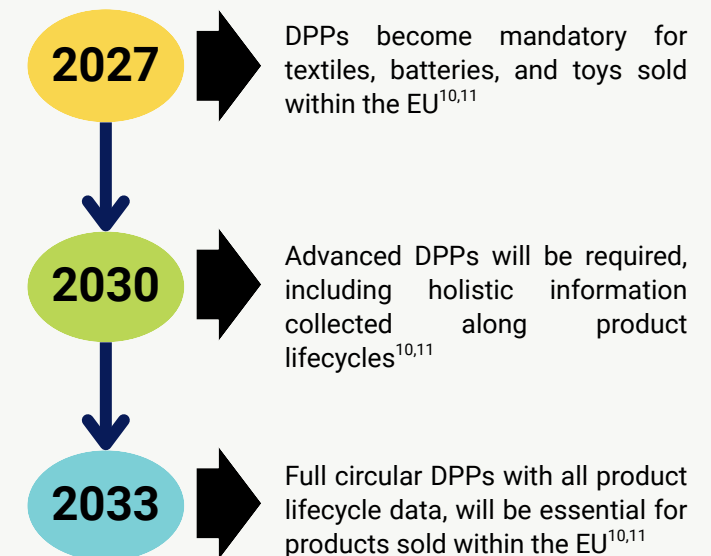
Upcoming DPP Requirements – EU Context

EU Ecodesign for Sustainable Products Regulation (ESPR) applies compulsion of DPPs for all textile products sold in the EU requiring product-specific digital records accessible via QR/Barcode/NFC.

Non-compliance = Restricted EU market access or penalties.

Must include verified data on:

- fibre composition and percentage blends
- Origin and sourcing of materials
- Environmental impact metrics
- End-of-life handling instructions



10. European Parliamentary Research Service: *Digital product passport for the textile sector (2024)*.

11. Textile World: *Preparing For The EU's Digital Product Passport: A New Mandate For Sustainability (2024)*.

2.6.3 DPP: CORE COMPONENTS AND DATA FIELDS

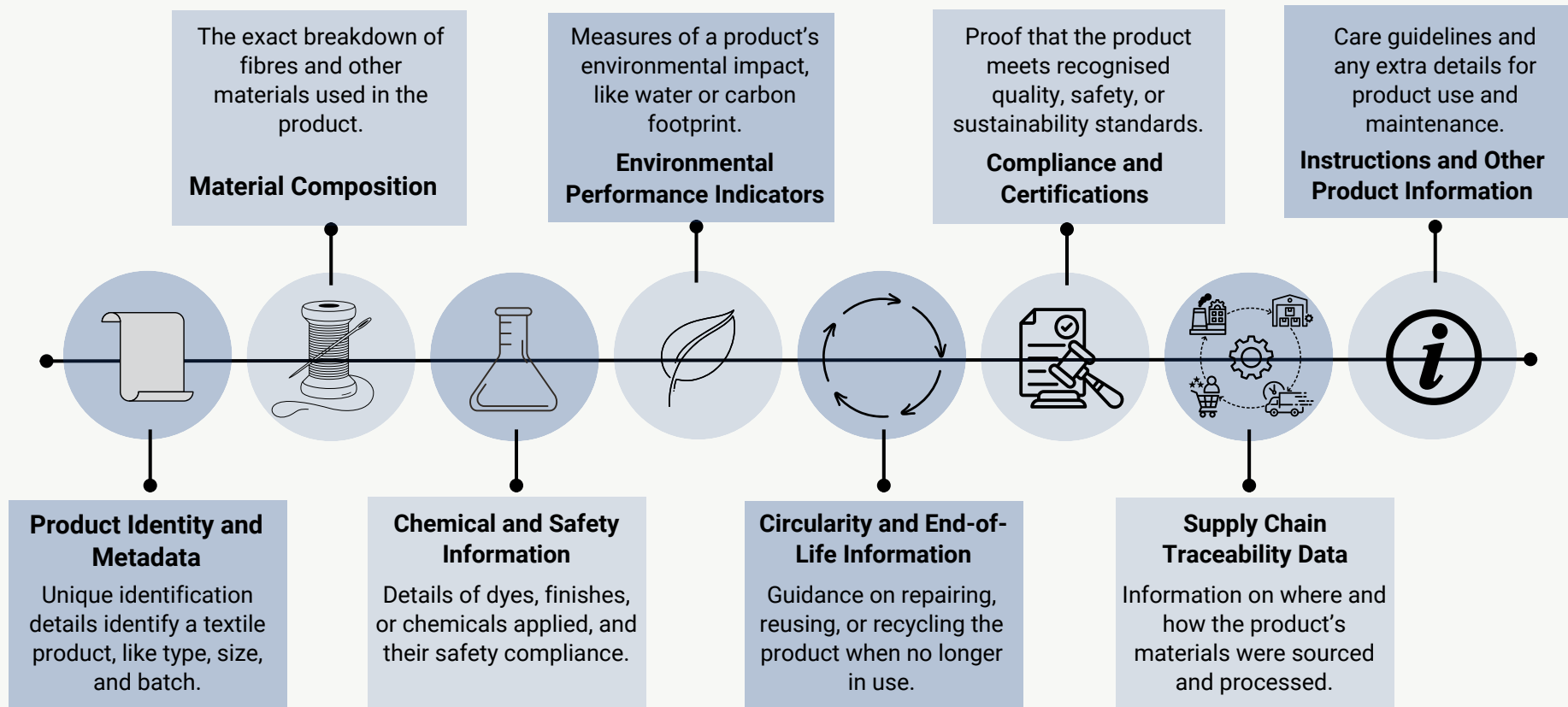




Illustration: Scanning a QR on a T-shirt

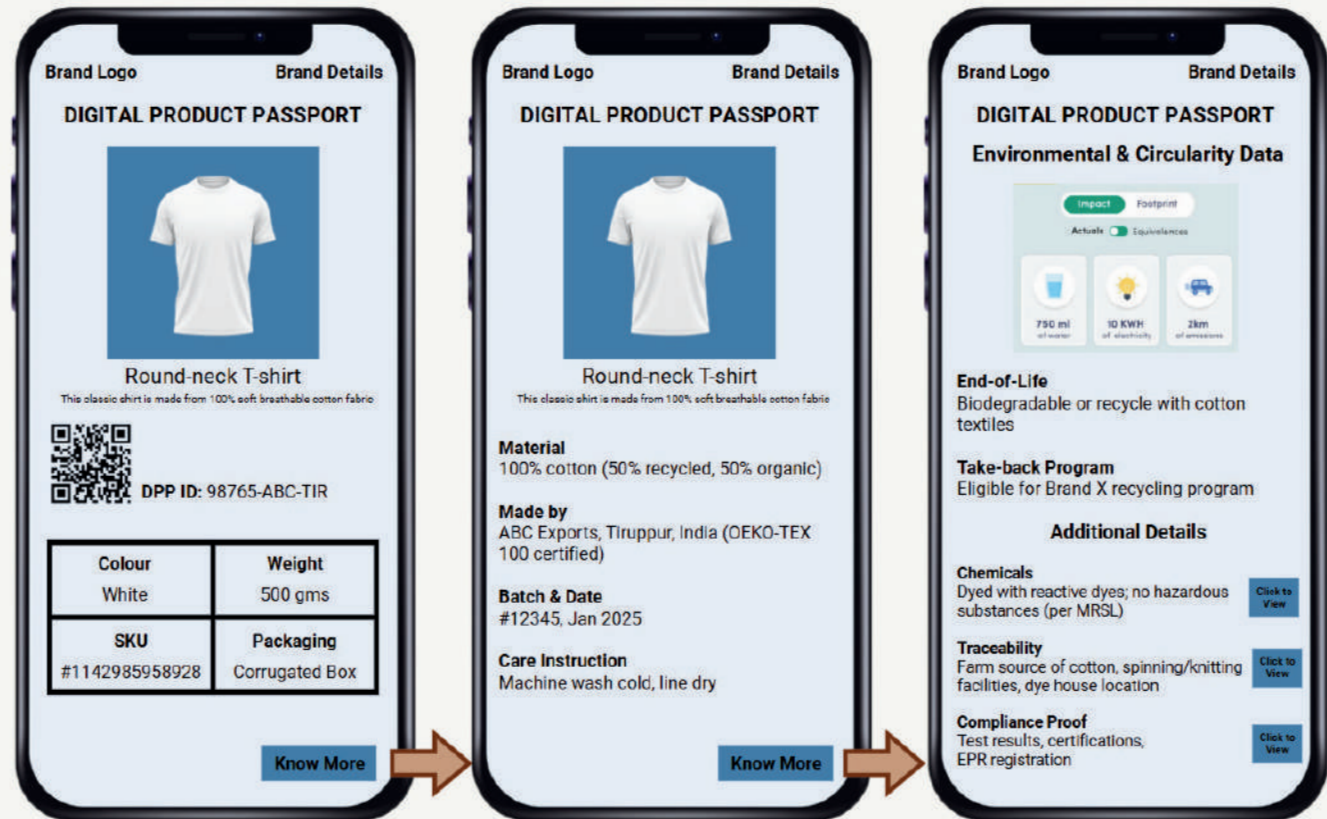
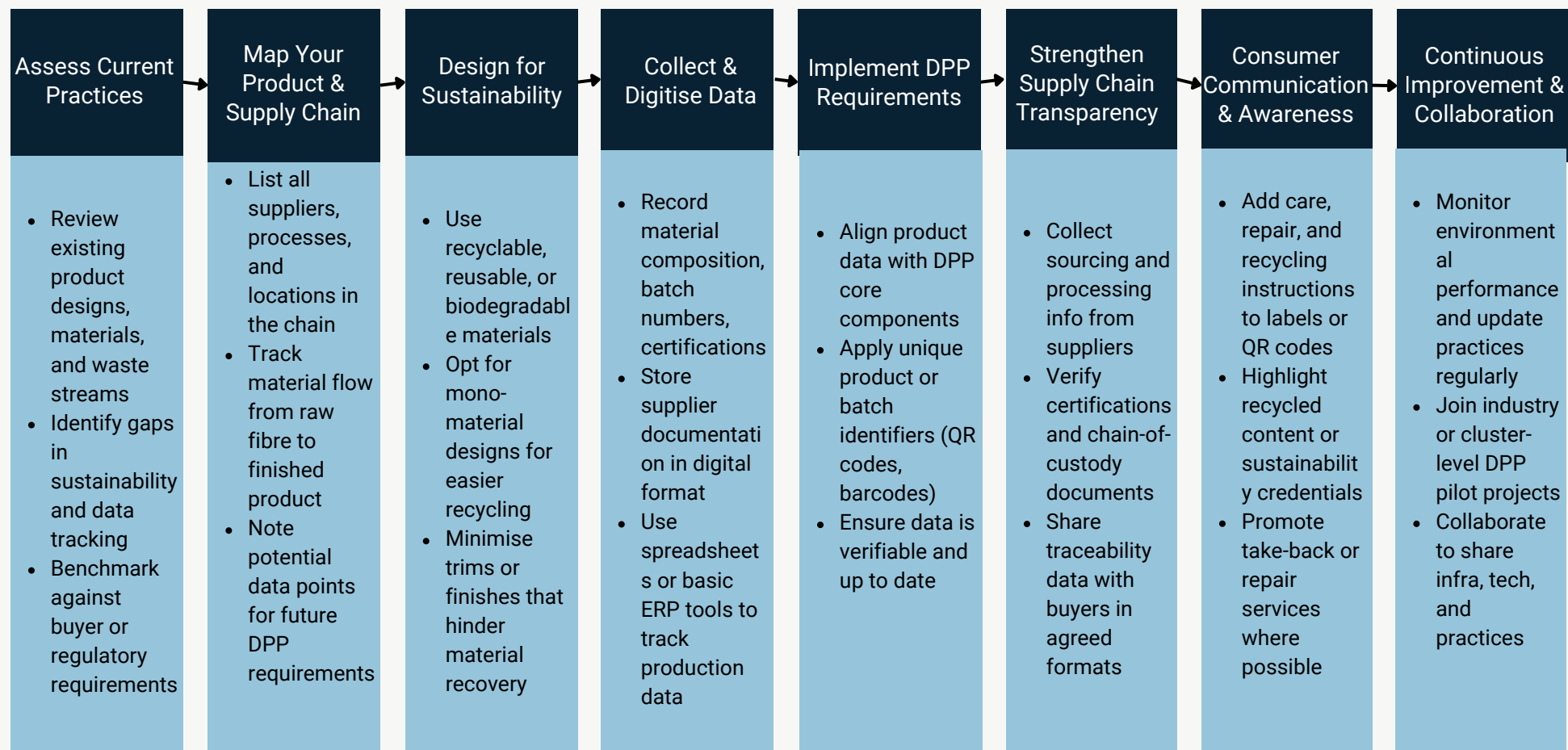


Image Source: Conceptualised by Conserve India

2.6.4 IMPLEMENTATION STEPS FOR MSMEs

A practical, phased approach for textile MSMEs to adopt DPP



2.6.5 TEXTILE WASTE RECYCLING & DIGITAL PRODUCT PASSPORT

Closing the Loop for waste

DPP driving Traceability in Recycling

- **Material Identification:** DPP gives recyclers accurate fibre composition and chemical treatment data, reducing guesswork and contamination.
- **Sorting Efficiency:** Clear, digital material info speeds up grading and reduces manual inspection costs.
- **Better End-Markets:** Certified material origin and quality (via DPP) improves buyer trust in recycled outputs.
- **Cluster Planning:** Aggregated DPP data can map waste volumes/types to justify new recycling investments.

Recycling visualised through DPP

- **Closing the Loop Proof:** Without recycling systems, DPP data on “recyclability” remains theoretical.
- **Compliance with Circularity Targets:** EU and brand requirements demand measurable recycling rates, not just recyclability claims.
- **Consumer Trust:** Showing that materials are actually recovered and reused validates the purpose of the DPP.
- **Value Chain Engagement:** Recycling creates the demand pull that motivates MSMEs and suppliers to input accurate DPP data.

2.6.6 DATA SHEET AND TEMPLATES

Product & Material Passport Data Sheet

Product Passport Data Sheet (for product/batch)

- **Product Details** – Name, SKU, batch number, quantity
- **Material Composition** – fibre %, recycled content %, trims info
- **Process Details** – Supplier names, locations, dates for spinning, weaving/knitting, dyeing, stitching
- **Compliance** – Certifications, test results, license numbers
- **Environmental Metrics** – Recycled content %, water saved, carbon footprint
- **End-of-Life Instructions** – Recycling/disposal guidelines, take-back info

Material Passport Template (for recycled inputs)

- **Source Origin** – e.g., post-consumer wool, post-industrial acrylic waste
- **Processing Method** – Mechanical or chemical, colour-sorting, dyeing info
- **Quality Parameters** – fibre length, strength, performance data
- **Sustainability Benefits** – Energy saved, water saved, avoided emissions
- **End-Use Options** – Recommended applications, recyclability notes

Templates for MSMEs

Purpose: To map each stage of the textile production process with key data points for traceability and Digital Product Passport (DPP) readiness. Below is a hypothetical table for visualisation:

Process Step	Supplier Name	Location	Material Input	Certifications	Date
fibre Sourcing	ABC Cotton Traders	Gujarat	Organic Cotton	GOTS Certified	Jan 10, 2024
Yarn Spinning	XYZ Mills	Tamil Nadu	100% Cotton Yarn	–	15/01/25
Fabric Weaving	LMN Textiles	Karnataka	Cotton Yarn	–	22/01/25
Dyeing/Finishing	Colour Fast Dyers	Tamil Nadu	Reactive Dyes (no hazardous)	OEKO-TEX 100	27/01/25
Garment Assembly	StitchPro Garments	Tiruppur	Finished Fabric	–	May 2, 2025
Packaging & Dispatch	PackRight Solutions	Tamil Nadu	Recycled Cardboard Packaging	FSC Certified	Aug 2, 2025

Quick Tips

- Keep the matrix updated per order or batch, and store it digitally for easy sharing with buyers or certifiers.
- Start with Excel/Google Sheets before moving to ERP or digital platforms.
- Share with buyers to prove material traceability and sustainability claims.

2.6.7 CLUSTER LEVEL USE CASE (HYPOTHETICAL EXAMPLE)

	Tiruppur Garment Exporter: QR-Enabled Traceability	Panipat Recycling Unit: Material Passport for Recycled Yarn
ACTION	• Exporter collaboration with an EU buyer to pilot QR code labels on every T-shirt with their supply chain. • Scanning the code will reveal product type, % recycled content, manufacturing facility details, ZLD dyeing process, care instructions, and brand's garment take-back programme.	• A recycler Introduced a "material passport" for every batch of shoddy yarn produced. • Passport will detail raw material sources (e.g., 80% post-consumer wool, 20% post-industrial acrylic waste), recycling process (mechanical, colour-sorted, no dyeing), and suggested end of life.
BACKEND	• The exporter will interact with their supply chain for transparency. • Through simple excel-based tracking, product passport capturing lot number, fibre composition, supplier and dye batch information, QC dates, and packing details. • This data will be uploaded to a cloud tool that'll auto-generated QR codes linked to each production lot (SKU).	• The enterprise will create a 1-page batch template, recording fibre composition, source origin, process notes, quality parameters (e.g., fibre length, strength), and sustainability benefits such as water and energy savings. • This template shared with B2B buyers like textile mills and carpet manufacturers to improve transparency.
IMPACT	• This will increase buyer's confidence by providing transparent and verifiable product data. • Enable rapid identification of defects to specific batches, reducing resolution time. • Integrate traceability into routine workflows, making it easier to scale for future DPP requirements.	• This will increase buyer's trust through documented proof of recycled content and processing method. • Position the MSME as a responsible supplier ready for future DPP integration. • Help downstream buyers communicate sustainability claims confidently, supporting cluster-wide adoption of traceability practices.

2.6.8 REFLECTIONS FROM THE GROUND

Traceability and Transparency at cluster level

1

Sorting Technology: Recyclers like Panipat based HSN Ecotex are adopting the Sorting technology like Fabritel Matoha Scanner to identify fibre compositions, an important step toward material traceability. However, the cost, awareness, and integration with the broader system remain limited.

2

Traceability Remains Aspirational: While international buyers demand product traceability, MSMEs find it hard to incorporate these systems due to financial, technological, and operational constraints.

3

Traceability Pilots: Clusters like Tirupur and Panipat have started piloting and experimenting on traceability compliance through partnering with companies like Green Story for DPP creation.

4

Trust Barriers in Reporting: Many worker groups are reluctant to share data or maintain documentation due to low trust and fear of misuse, which makes it difficult for MSMEs to ensure transparent reporting for traceability.

2.6.9 CASE STUDY

Green Story

A data platform that helps textile and apparel companies track and report the environmental footprint of their products across the supply chain.

- Collects and verifies supplier data on materials, production, transport, use, and end-of-life.
- Integrates with tools like the Higg Index to provide life cycle assessment (LCA)-based metrics.
- Generates Digital Product Passports (DPPs) that include carbon, water, and waste data for compliance with EU ESPR and buyer requirements.

Builds trust with global buyers by proving traceability and compliance, making sustainability claims credible, and unlocking market access through standardised environmental and social data.



Click Here To Know More : <https://www.greenstory.io/>

Empowering Suppliers with Credible Sustainability Data

Accurate environmental footprint data for the textile and apparel industry

PRODUCT DETAILS

Category: Clothing
Sub-category: T-shirt
Product: T-shirt

SUPPLIER DETAILS

Supplier: GreenStory Ltd - India
Location: Bangalore
Region: South

SUPPLY CHAIN

Components

Name	Weight

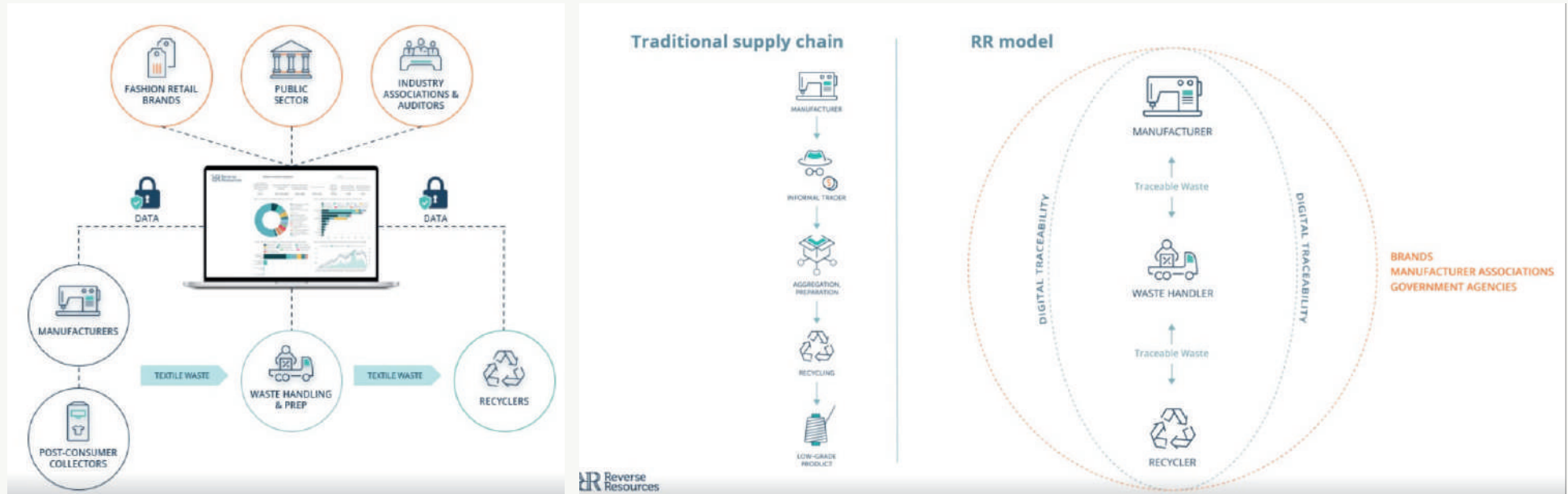
Supplier summary

Name	Production 1	Production 2	Production 3

Manufacturing Distribution Use phase End of life

Image Source: Green Story

Reverse Resources



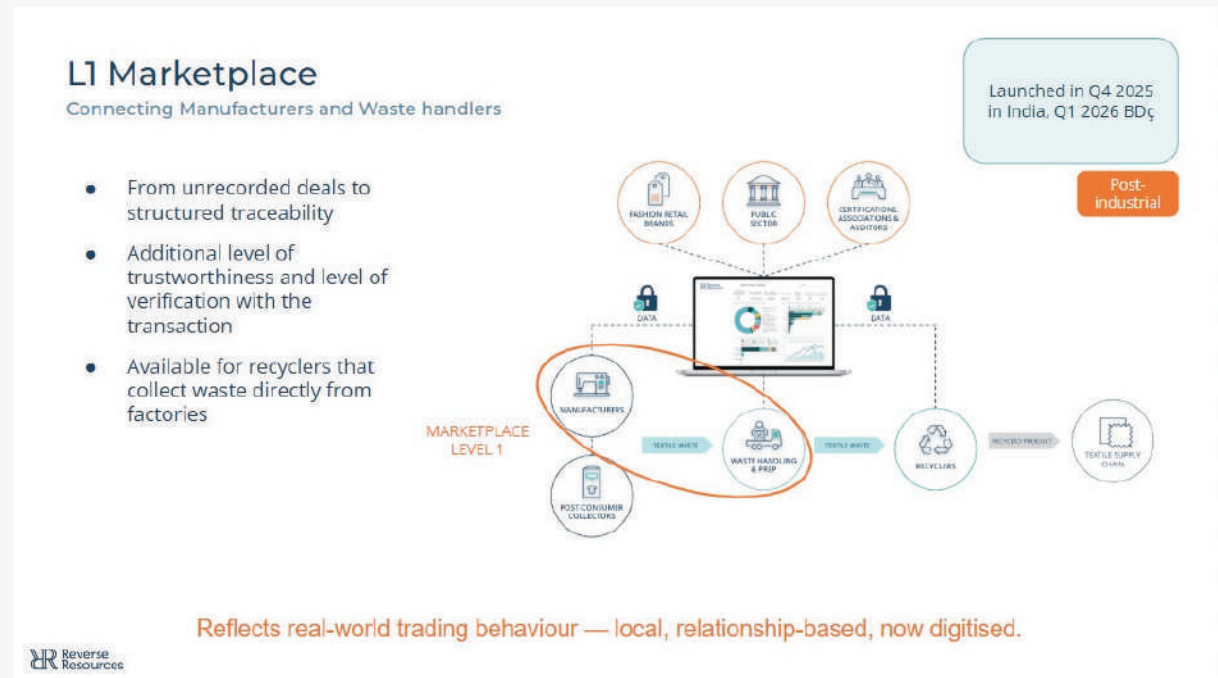
Click Here To Know More : <https://www.reverseresources.net/>

Image Source: Reverse Resources

Reverse Resources - Innovating for a marketplace for textile waste

A Circular Marketplace for Post-Industrial Textile Waste

The Reverse Resources Marketplace is a digital platform designed to connect manufacturers, waste handlers, recyclers, and brands—unlocking value from post-industrial textile waste while ensuring traceability, compliance, and circularity.



Click Here To Know More <https://www.reverseresources.net/>

Image Source: Reverse Resources

2.6.10 CASE STUDY

Reverse Resources

A data platform that helps textile and apparel companies track and report the environmental footprint of their products across the supply chain.

- Collects and verifies supplier data on materials, production, transport, use, and end-of-life.
- Integrates with tools like the Higg Index to provide life cycle assessment (LCA)-based metrics.
- Generates Digital Product Passports (DPPs) that include carbon, water, and waste data for compliance with EU ESPR and buyer requirements.

Builds trust with global buyers by proving traceability and compliance, making sustainability claims credible, and unlocking market access through standardised environmental and social data.



Image Source: Reverse Resources

2.6.11 ADDITIONAL READINGS AND RESOURCES

EU Ecodesign for Sustainable Products Regulation → [Here](#)

GS1 Digital Product Passport Standards → [Here](#)

TrusTrace: The Traceability Playbook for Fashion Supply Chains - [Here](#)

Kellerman Consulting: Tracability guidebook - [Here](#)

Textile Exchange Standards → [Here](#)

Circular Fashion Material Data Templates → [Here](#)

Circular.fashion CircularityID → [Here](#)

TrusTrace: The Traceability Playbook for Fashion Supply Chains - [Here](#)



2.7 Social Inclusion

2.7 SOCIAL INCLUSION

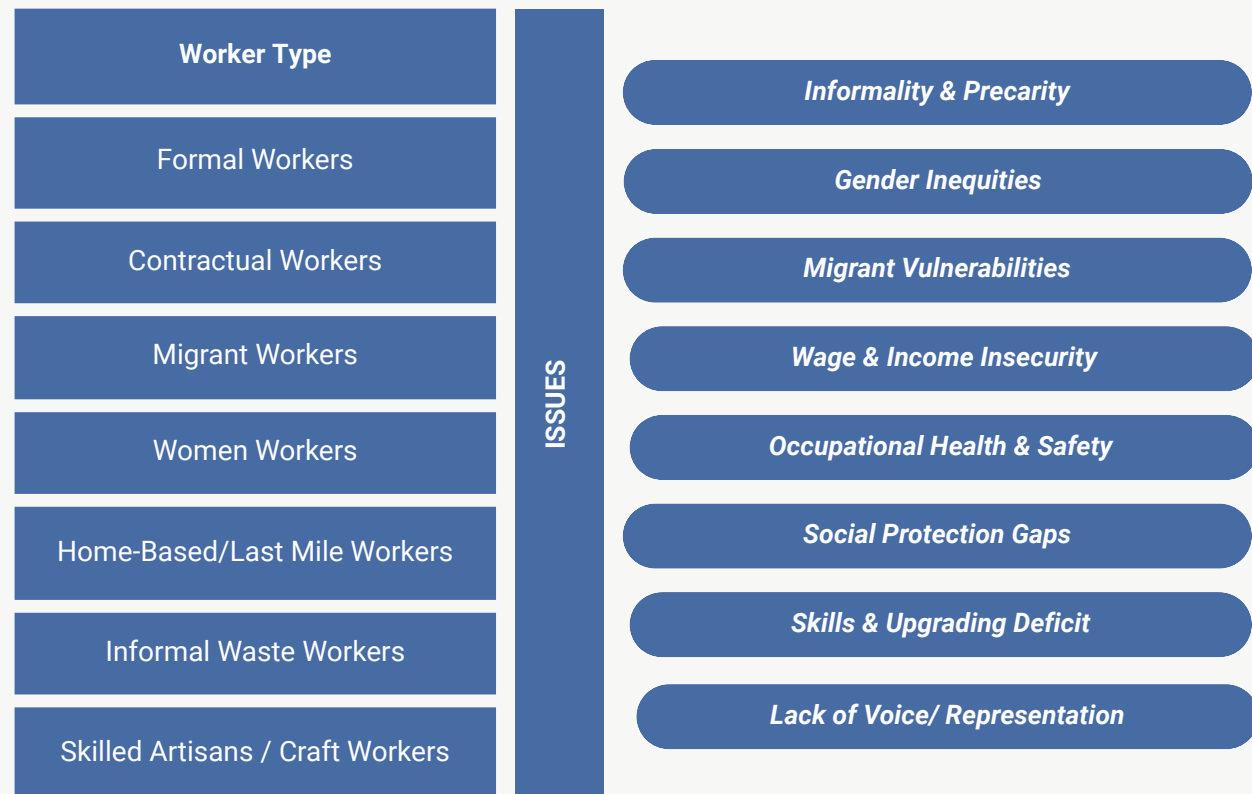
2.7.1. Textile Sector Workforce.....	174
2.7.2. Gender Lens in the Textile Waste Value Chain.....	180
2.7.3. Migration in the Textile Waste Value Chain.....	182
2.7.4. Inclusion and Circularity.....	184
2.7.5. Integration and Collaboration.....	185
2.7.6. Reflections from the Ground.....	188
2.7.7. Framework for Social Inclusion.....	189
2.7.8. Case Study.....	191
2.7.9. Application of C-SELF Framework	192
2.7.10. Additional Readings and Resources.....	205

2.7.1 TEXTILE SECTOR WORKFORCE

India's second largest employer after agriculture

The textile sector employs a diverse mix of workers - from factory employees to home-based artisans - forming the backbone of India's manufacturing economy.

However, persistent gaps in formality, protection, and equity continue to affect productivity, resilience, and inclusivity across the value chain.



Informality of Workforce in Textiles

Invisible Labour

- Home-based, women, and migrant workers often excluded from official data.
- Informal units rarely registered under MSME norms.

Fragmented Employment

- Small contractors and sub-contracting chains dominate.
- No long-term contracts, weak collective bargaining.

Low Social Security Coverage

- Only a fraction enrolled in ESI, PF, or insurance.
- Reliance on cash wages without payslips.

Lack of Voice & Representation

- Minimal unionisation among informal textile workers.
- Workers rarely involved in decisions on working conditions.

Skill Mismatch

- Limited training/upskilling opportunities → workers stuck in low-value roles with no avenues to upskill.

Gendered Informality

- Women concentrated in handwork, finishing, sorting, often unpaid family labour.

Actions / Compliance for Social Change

Promoting circularity in textiles is not only about materials and technologies but also about social impact and worker wellbeing. The Social Impact Framework for Circularity (SIAF-CE) highlights how MSMEs can integrate fair jobs, gender equity, inclusion, and wellbeing into their operations.

The table on the right outlines practical actions and compliance measures at different levels:

- Structural Level
- Relational Level
- Transformational Level

By adopting these measures, MSMEs can strengthen compliance, improve worker trust, and align with international buyer expectations on social sustainability.

Adpated from The SIAF-CE: The Social Impact Framework for Circularity. Source: (Suarez-Visbal et al., 2022), <https://doi.org/10.4324/9781003255246-9>

Indicator	Description	Social Change Actions
Structural level	Quality of Jobs	1. Open salary policy 2. Health and security 3. Equal opportunity 4. Written contracts 5. Permanent contracts 6. Equal pay policy and practice 7. Employee job promotion policy 8. Incentive program 9. Training program 10. Training budget 11. Overtime policy and practice
	Workers wellbeing	1. Vacations 2. Wellness program on place 3. Incentive programs for wellness 4. Transports subsidy 5. Onsite child care/support 6. Personal growth program training 7. Flexible schedule 8. Other benefits
	Gender Equality and Inclusion	1. Gender policy on place 2. Training on Gender based violence (GBV) 3. Special training for women workers
Relational Level		1. Collective labour agreement adherence 2. Specific role for gender equality and diversity 3. Existence of workers committee
Transformational Level		1. Social mission, values and mindset

Key Social and Environmental Certifications for Textile MSMEs- National Level

Environmental Compliance (CPCB / SPCB System)

Regulatory Basis: Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; and Environment (Protection) Act, 1986.

Issuing Authorities: Central Pollution Control Board (CPCB) & State Pollution Control Boards (SPCBs).

Mandatory Certifications / Consents:

- Consent to Establish (CTE) and Consent to Operate (CTO) for dyeing, printing, and processing units.
- Hazardous Waste Authorization (for ETP sludge, chemical residues).
- Plastic Waste EPR Registration (for PIBOs using packaging).
- ETP/ZLD Compliance Certificates (specific to water-intensive clusters like Panipat, Tirupur, Surat).

Purpose: Ensures safe discharge, waste handling, and pollution control compliance; non-compliance can suspend factory operation.

Product & Material Standards (BIS / MoT Quality Control Orders)

Regulatory Basis: Bureau of Indian Standards Act, 2016; Quality Control Orders (QCOs) notified by Ministry of Textiles (MoT).

Applicable Certifications:

- BIS (ISI Mark) Certification – mandatory for select yarns, fabrics, and technical textiles (e.g., Agro, Geo, Medical, Protective categories).
- Eco-labeling and traceability under BIS norms for sustainable textiles.
- Ensures conformity with national safety, durability, and performance benchmarks.

Key Social and Environmental Certifications for Textile MSMEs-National Level

Circularity & Sustainability Certification (Voluntary, India-Specific)

Program: MSME Sustainable (ZED) Certification – Bronze, Silver, Gold.

Implementing Body: Ministry of MSME, Government of India.

Scope: Environmental, energy, waste, safety, and social maturity assessment.

Benefits: Recognition, financial subsidy (up to 80%), and priority access to government tenders and financing (GIFT/SPICE).

Legal Basis: Factory Act, EPFO & ESIC Acts; CLRA & ISMW Acts (to be integrated under Labour Codes).

Labour & Social Compliance (Ministry of Labour & Employment)

Key Registrations/Obligations:

- Factory Licence (Occupational Safety & Working Conditions Code, pending enforcement).(ISO 45001 (Occupational Health & Safety Management).
- EPFO & ESIC registrations for worker welfare.
- Contract Labour & Migrant Workmen Licences (as applicable).
- POSH Compliance – Internal Committee and training on workplace safety.
- Encouraged adoption of social accountability standards (SA8000 / ISO 45001) alongside statutory compliance.

While India has legislatively consolidated its labour framework under four Labour Codes (2019–2020), most States continue to operate under the legacy Acts (Factories Act, EPFO, ESIC, CLRA, ISMW) until full implementation. Textile MSMEs must maintain compliance with existing laws until notified otherwise. POSH (2013) remains separately enforceable.

Key Social and Environmental Certifications for Textile MSMEs-Global Level

To access global markets and meet buyer requirements, MSMEs need to comply with certifications that address fair trade, worker welfare, recycling standards, and ethical practices across the textile value chain.

Fair Trade Certifications	Fairtrade International (FLOCERT)	Ensures fair wages, safe working conditions, no child labour, and worker representation across the textile value chain.	Read More (Here)
	World Fair Trade Organisation (WFTO Guarantee System)	Certifies enterprises against 10 principles of fair trade, including transparency, gender equity, and sustainable livelihoods.	Read More (Here)
Environmental & Social Standards	Global Organic Textile Standard (GOTS)	Covers organic fibre processing and integrates social criteria like safe workplaces, no child/forced labour, and decent wages.	Read More (Here)
	Cradle to Cradle (C2C) Certified™	A holistic certification addressing material health, circularity, renewable energy, water stewardship, and social fairness in textile production.	Read More (Here)
Circularity & Recycling Standards	Global Recycled Standard (GRS)	Tracks recycled material content while verifying social, environmental, and chemical practices across the supply chain.	Read More (Here)
	Higgs Index (by SAC)	A modular toolset that measures environmental and social impact of textile facilities, brands, and products.	Read More (Here)
Social & Ethical Compliance Frameworks	Sedex / SMETA Audit	Ensures fair wages, safe working conditions, no child labour, and worker representation across the textile value chain.	Read More (Here)
	NEST Ethical Compliance	US-based standard focusing on home-based and artisan workers, ensuring they are visible, safe, and fairly paid in global supply chains.	Read More (Here)

2.7.2 GENDER LENS IN THE TEXTILE WASTE VALUE CHAIN

Women are a major part of the textile waste workforce, but their skills, earnings, and safety are often undervalued — addressing this can improve productivity, quality, and compliance for MSMEs.

Women Participation

- Majority in sorting, cleaning, and segregation tasks
- Typically manual and low-skill roles
- Rare representation in supervisory level

Income Gaps

- Earn less than men due to piece-rate and role division
- Lack of written contracts, no overtime, no social security
- Limited bargaining power

Health Impact

- Prolonged exposure without safety gears
- Bad postures in sorting and segregation causing chronic pain
- Little focus on health check-ups

Agency & Leadership

- Rare participation in cluster-level committees or associations
- Reduced leadership opportunities and access to learning
- Absence in decision-making limits gender-sensitive policies

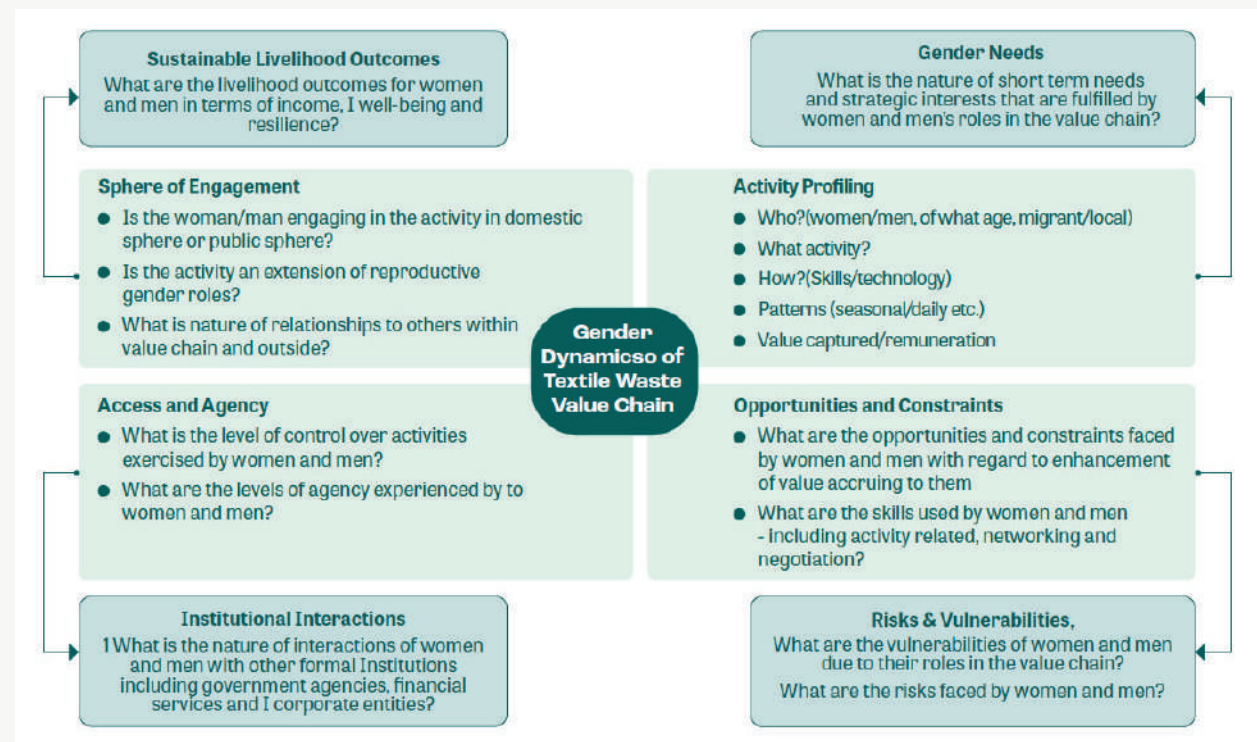
Analysing gender dynamics in the textile waste value chain

The framework shows how gender shapes participation and outcomes in the textile waste value chain.

It looks at who does what work, how value and income are shared, and what opportunities or barriers exist for women and men.

It also considers women's access to decision-making, training, and formal institutions.

By highlighting risks, needs, and agency gaps, it helps MSMEs make their operations more inclusive and fair.



IDH, Imperatives and Opportunities for Gendered Interventions in the Textile Waste Value Chain (2025)

2.7.3 MIGRATION IN THE TEXTILE WASTE VALUE CHAIN

Migrant workers are a vital part of the textile waste chain, but high turnover and poor living conditions impact productivity and quality. Migrant workers, mainly from rural areas or other states with few local job opportunities, often join sorting, loading, cutting, or recycling units without prior textile experience – learning skills directly on the job.

Drivers of Migration in Textile Waste Clusters

- **Economic Push:** Lack of local employment in home regions
- **Economic Pull:** Opportunities of wage in industrial towns, even if low-paying
- **Cluster Growth:** Expansion of recycling and waste processing units creates constant demand for low-cost labour
- **Labour Networks:** Recruitment often happens through friends, relatives, or contractors already working in the cluster

Vulnerabilities Faced by Migrant Workers

- Seasonal turnover during harvests/festivals disrupts schedules
- Overcrowded housing near factories with poor hygiene
- No local ID → blocked from welfare schemes
- Low safety training increases injury risk
- No PPE for hazardous handling tasks
- Language barriers affect instructions & teamwork
- Irregular attendance due to long commutes or family duties
- Limited upskilling keeps workers in low-paid roles

Intersection of Gender and Migration

Gender and migration intersect in the textile waste workforce, shaping access to skills, safety, and economic opportunities — with direct implications for MSMEs in recycling and recycled product manufacturing.

- High **female migrant** share in waste sorting, cleaning, and grading roles.
- **Triple vulnerability** amongst women (Informality, access to resources, and disadvantaged background).
- Concentration in **lowest-paid roles** with limited/no skill advancement.
- **Limited representation** in decision-making or supervisory positions.
- Heightened **health risks** due to unsafe housing and lack of PPE.
- **Skill stagnation** as no access to technical or machinery training.
- **Short-term employment** cycles due to family care responsibilities.
- **Untapped skill potential** needing targeted training.



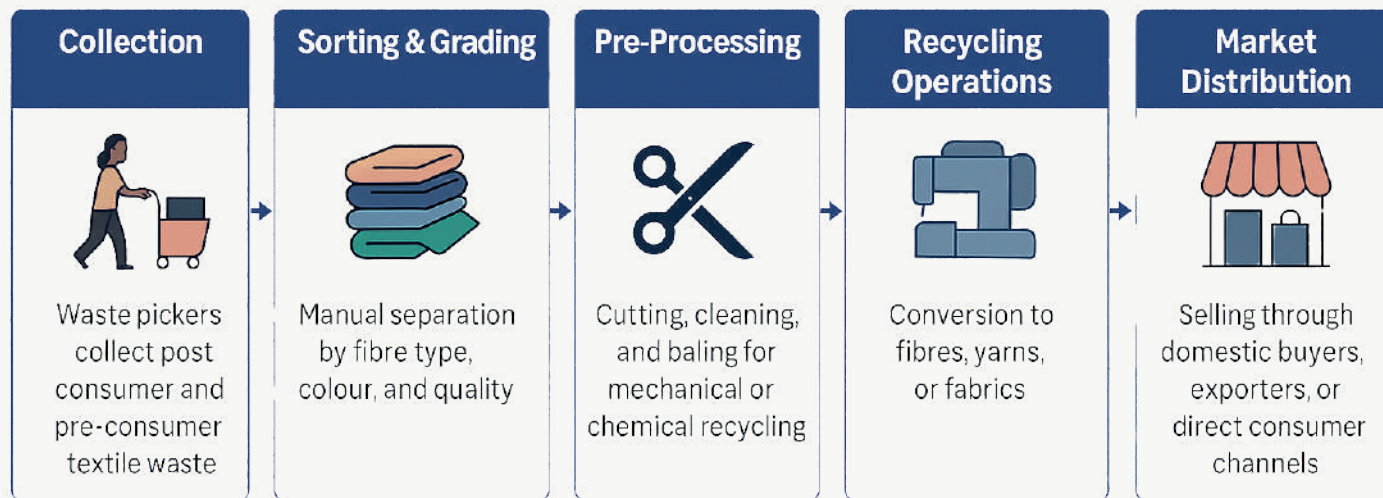
Photo Credit @Conserve India

2.7.4 INCLUSION AND CIRCULARITY

Why Inclusion Strengthens Circularity

Social inclusion is a driver of business competitiveness, material quality, and environmental impact, not just a moral imperative.

- **Higher Material Quality:** Skilled, trained workers improve sorting accuracy and reduce contamination.
- **Buyer Confidence:** Brands with strong ESG mandates prefer suppliers with inclusive labour practices.
- **Operational Stability:** Fair treatment reduces workforce turnover and dependency on casual labour.
- **Market Differentiation:** Demonstrating inclusive, traceable supply chains attracting premium buyers.
- **Compliance & Reputation:** Meeting global due diligence standards and safeguard against reputational risks.



Journey of waste in an inclusive circular economy

Photo Credit, AI generated

2.7.5 INTEGRATION AND COLLABORATION

Waste Picker Integration and Respectful Collaboration

Waste pickers form the backbone of India's textile waste recovery system, playing a critical role in collecting, sorting, and channeling both pre- and post-consumer waste across clusters. Formalising their participation and building structured collaborations with recyclers, MSMEs, and local authorities can significantly strengthen textile waste supply chains.

One key pathway to strengthen inclusion in textile circularity is through the formal integration of waste pickers, who form the backbone of textile waste recovery network for :-

- **Steady Raw Material Supply** – Reliable flow of post-consumer textile waste, reducing sourcing costs and downtime.
- **Sorting Expertise** – Skilled identification of fibres, blends, and contamination, reducing recycling errors.
- **Cluster Connectivity** – Expands collection reach into rural and unorganised markets.
- **Buyer Appeal** – Enhances sustainability profile, attracting ethical buyers and green-certified markets.
- **Reduced Pre-Processing Costs** – Well-sorted waste reduces in-house labour and machine wear.
- **Compliance & Traceability** – Supports DPP/EPR documentation by providing material source records.
- **Social Impact Branding** – Enables MSMEs to market products as socially responsible and inclusive.

Collaboration Strategies at Policy, Cluster, and MSME Level

High-level strategies for public sector, MSMEs, and informal sector integration that create an enabling environment for inclusive textile waste management.

Public Sector Intervention

- Policy and Stakeholder Recognition
- Enhance cluster's access to schemes & subsidies
- Create Social Protection Linkages
- Convene and create enabling conditions within cluster for establishment of Common Facilities Centres

Direct MSME Collaboration

- Partnerships with SHGs & Cooperatives
- Fair Contracts
- Training & Upskilling
- Revenue Sharing
- Cluster-Level collaborations

MSME Integrating Informal Sector into Supply Chain

- Supplier Recognition of waste pickers
- Integrate informal workers' contributions
Social Protection Coverage
- Establish Health & Safety norms
- Facilitate dialogue and co-designing
- Inclusive procurement and sourcing

Policy Push + Adoption Pull + Informal Sector Inclusion = Inclusive & Circular Textile Ecosystem

Practical Actions for MSMEs

Specific steps MSMEs can take to integrate waste pickers into their operations, ensuring fair pay, safe conditions, and reliable supply chains.

Fair Payment & Transparent Contracts	Ensure fixed, timely payments with simple agreements to build trust
Skills Recognition & Training	Value waste pickers' expertise and upskill them for better roles
Safe & Hygienic Work Conditions	Provide PPE, clean spaces, and basic sanitation facilities
Stable Supply Chain Partnerships	Create long-term sourcing agreements with cooperatives and NGOs
Inclusion in Operational Planning	Engage waste picker reps in process planning and quality standards
Social Protection & Benefits	Link workers to welfare schemes, insurance, and health services
Upgrading from Collector to Entrepreneur	Support micro-units, bookkeeping skills, and shared machinery access
Brand Story & Ethical Marketing	Showcase inclusive recycling in marketing, CSR, and buyer reports

2.7.6 REFLECTIONS FROM THE GROUND

Workforce, Informality, and Inclusion

1

Informal Sorting Ecosystems: The sorting process is largely manual and informally managed, offering no social protection to last-mile supply chain workers.

2

Role of Women: Women in sorting and segregation roles face issues with high travel time and no overtime policies. Women are also fired first when business is slow.

3

Labour Tensions: Concern over the unpredictability of labour, especially in an informal contract system.

4

Reduced Migration: Decline in migrant labour from UP and Bihar, with workers opting for Tier 2/3 city jobs closer to home.

5

Power Imbalance: Owners are wary of employee attrition and note that working conditions are sometimes dictated by the workforce itself like unionised labour in Panipat holds considerable power.

6

Divisions on religion and caste: There are often unrecorded cases of exploitation basis on religion and caste with wasteworkers being treated the worst as they are usually from lower caste.

2.7.7 FRAMEWORK FOR SOCIAL INCLUSION



Built on **OECD job quality**, **Sustainable Livelihoods Framework**, and **BSR Gender Equality & Inclusion Tool**, it ensures inclusion of labour, livelihoods, and gender equity in textile assessments. This framework helps map trade-offs and synergies across waste, water, energy, and labour challenges, making it highly suited to complex textile cluster realities.

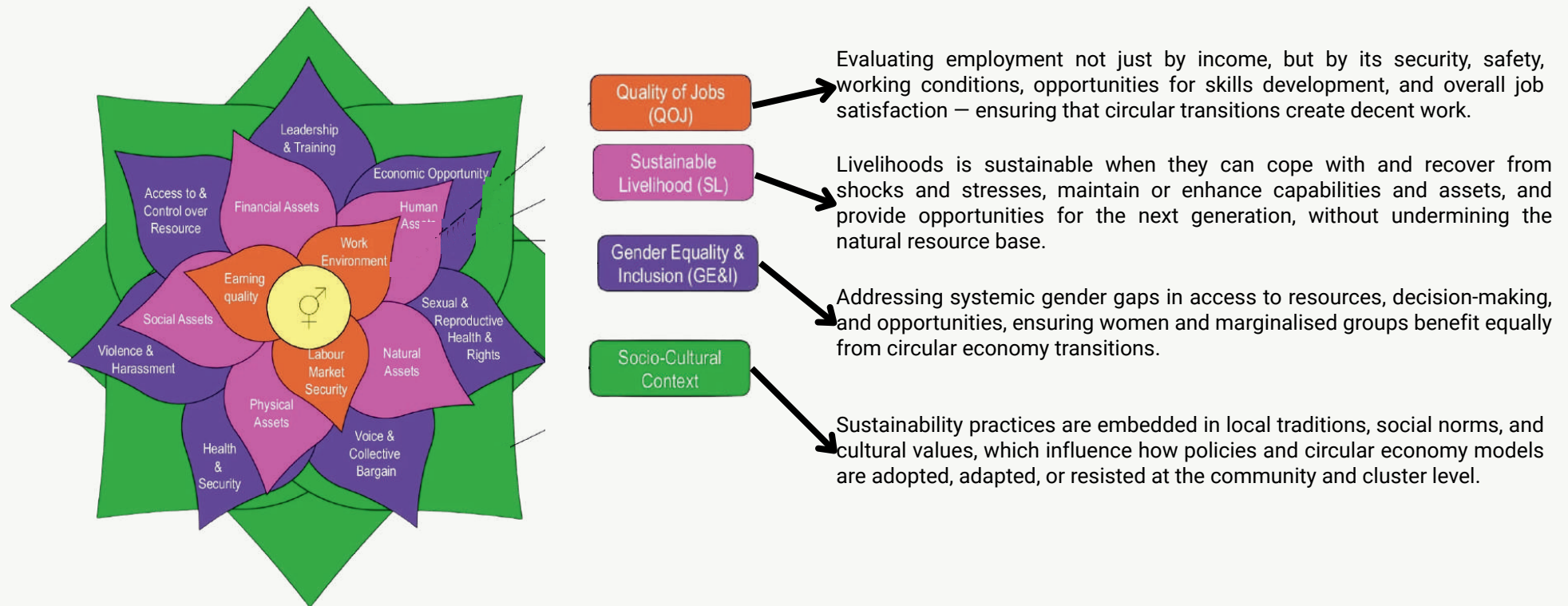
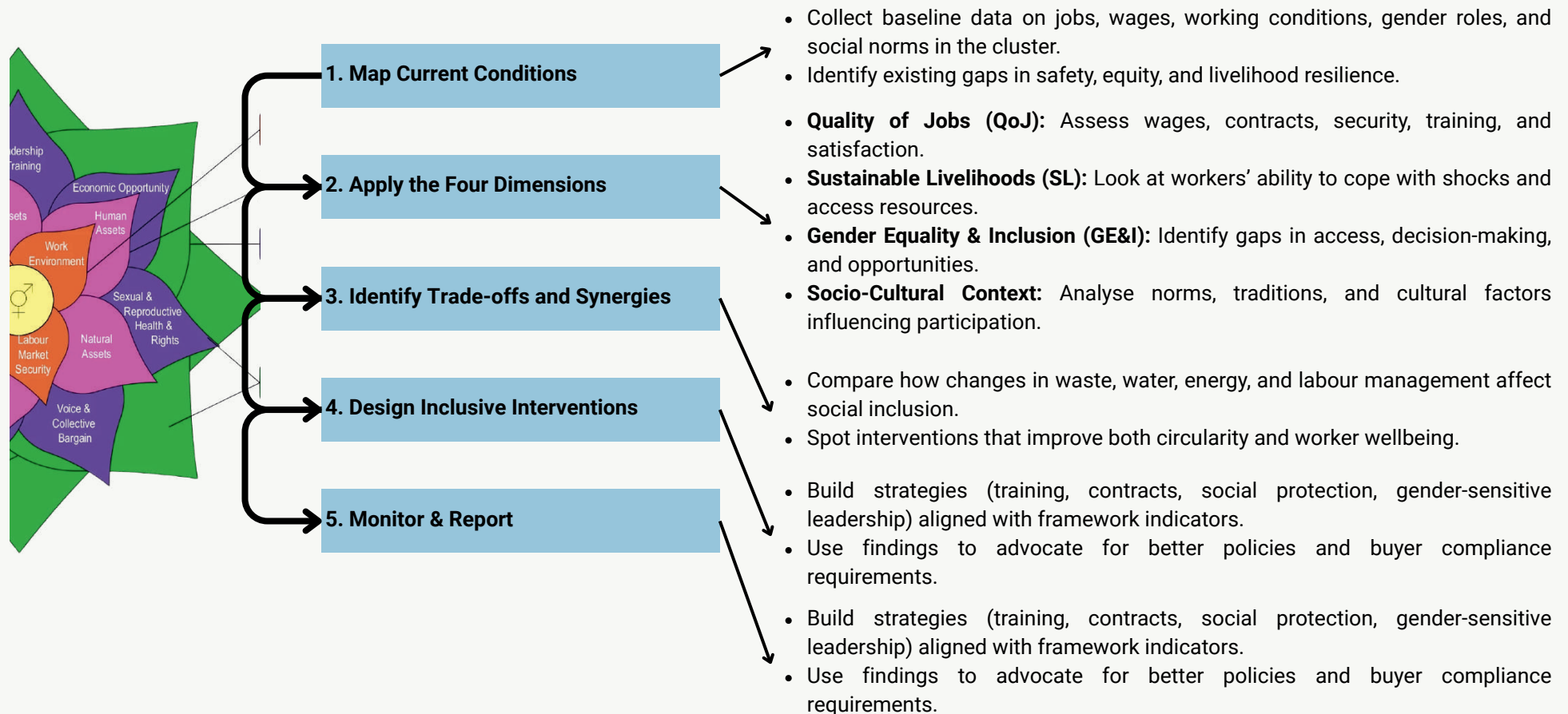


Figure 1: The SIAF-CE: The Social Impact Framework for Circularity. Source: (Suarez-Visbal et al., 2022), <https://doi.org/10.4324/9781003255246-9>

How to Use the SIAF-CE Framework in Textile Clusters



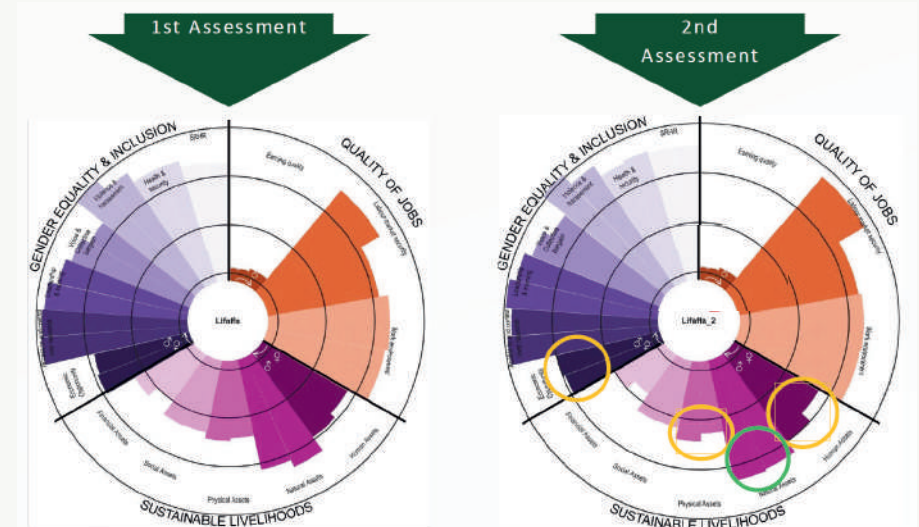
2.7.8 CASE STUDY

LIFAFFA is a social enterprise that upcycles textile and plastic waste into fashion and lifestyle products, while engaging marginalised communities in production social justice and environmental regeneration in its products.

They combine environmental regeneration with fair employment practices, ensuring workers are included in decisions, paid fairly, and provided with safe working conditions.

By applying the Framework for Social Inclusion, LIFAFFA assessed their operations on indicators such as employment security, workplace participation, health, gender equality, and community belonging.

- Introduced written contracts to ensure predictable wages and job security.
- Provided training in upcycling techniques and safe handling of waste materials.
- Set up worker committees for participation in workplace decisions.
- Implemented health measures, including protective gear and regular check-ups.
- Created gender-sensitive policies, ensuring equal pay and opportunities
- Tracked social impact through periodic assessments using framework.



LIFAFFA → Social Impact Assessment

Click Here To Know More : <https://www.instagram.com/lifaffa/?hl=en>

2.7.9 APPLICATION OF C-SELF FRAMEWORK

The C-SELF Framework (Circular Social & Environmental Labour Framework) helps textile MSMEs look beyond technology and cost, and examine how people, environment, legal compliance, and financial practices are managed inside their own business.

It builds on 4 pillars:

- Social
- Environmental
- Legal
- Financial

which together give a holistic picture of how responsibly and fairly a unit operates.



C-SELF Framework by Lis Suarez, University of Utrecht and Conserve India

How C-SELF Links Back to Circularity

Applying C-SELF is not only about “compliance” – it directly influences circular textile transitions:

- Social pillar ensures that workers in sorting, recycling and TRF units have safer, more dignified jobs, reducing turnover and errors.
- Environmental pillar pushes units to manage resource use, chemicals and waste more systematically, which is essential for credible recycled products.
- Legal pillar reduces risk of non-compliance as EU-aligned due diligence norms strengthen.
- Financial pillar supports stable, fairly paid work, making circular business models more resilient and attractive for finance.

MSMEs are encouraged to treat the C-SELF tool as a living document: start simple, fill what you can, and build depth over time as capacity and partnerships grow.

When and How to Use this Tool

This section provides an in-depth, step-by-step tool that MSMEs can use to:

- Assess current practices in each C-SELF pillar
- Identify gaps and risks (especially for workers and informal actors)
- Prioritise 3–5 concrete improvement actions
- Track progress over time (e.g. annually)

When to use	Who should be involved	Time required
When starting a new RECE / circularity initiative (baseline) When applying for schemes (GIFT/SPICE, ZED, etc.) where social and environmental practices matter Once a year as part of internal review, or before buyer audits	• Owner / senior manager • Production or operations in-charge • HR / admin or accounts person • 2–3 worker representatives (ideally including women, migrant workers and contract workers) • Where relevant, a representative of informal workers or SHGs linked to the unit	2–3 hours for a first rapid assessment ½ day if you also want to agree detailed actions and timelines

How to Apply

Overall Method: 5 Steps to follow

1. Form a small C-SELF team
2. Pillar-wise self-assessment (using guiding questions)
3. Score each area and note current practice, improvements, challenges
4. Prioritise actions and assign responsibilities
5. Review progress after 6–12 months

Scoring Scale (0–3)

Ask the team to agree a score for each area

0 – Not in place

No practice/policy; actions are ad-hoc or absent

1 – Basic / informal

Something happens, but informally; not documented; depends on individuals

2 – Partial / evolving

Some systems exist, applied in parts of the unit; gaps remain

3 – Strong / consistent

Clear policy, implemented consistently, documented; workers know and can use it

The tool can be used on paper, on a simple Excel sheet, or as a printed template.
You will note Score + Current Practice + Improvements + Challenges for every area.

Use the table in the next few pages as a template.

For each area:

- Discuss current practice,
- Agree a score (0–3),
- List improvements & challenges.

Social Pillar – Worker Rights, Safety & Transparency

Environmental Pillar – Resource Use, Pollution & Circularity

Legal Pillar – Labour, Child Protection & Compliance

Financial Pillar – Worker Earnings, Benefits & Enterprise Stability

Social Pillar – Worker Rights, Safety & Transparency

Worker Rights	• Do all workers (including helpers, cleaners, sorters, informal workers on site) know their basic rights (wages, working hours, leave, identity documents)? • Are appointments, terms and conditions given in writing and in a language they understand? • Are wage slips issued regularly and clearly?
Harassment & Prevention	• Is there a clear policy against harassment, bullying and discrimination (especially gender-based)? • Is there an Internal Complaints Committee (ICC) where legally required, and do workers know how to access it? • Are there any safe, confidential channels for complaints?
Work Conditions	• Are working hours and overtime within legal limits? • Are drinking water, toilets (separate for women/men where relevant), seating and rest breaks available? • Are migrant and contract workers housed in safe, hygienic conditions (if accommodation is provided)?
Health & Safety	• Are PPE (gloves, masks, ear protection, safety shoes) provided where needed? • Are there clear emergency exits, fire extinguishers, first-aid kits and visible signage? • Are workers trained on machine safety, handling chemicals, and safe lifting?
Training & Voice	• Do workers receive any training (skills, safety, rights, environment)? • Are there regular team meetings where workers can raise issues? • Are women and informal workers able to participate and speak?

Areas & guiding questions

Social Pillar – Template

Area	Score (0–3)	Current Practices	What can be improved?	Challenges / Risks	Responsible & Timeline
Worker Rights					
Harassment & Prevention					
Work Conditions					
Health & Safety					
Training & Voice					

Environmental Pillar – Resource Use, Pollution & Circularity

<i>Environmental Policy & Responsibilities</i>	• Is there a basic written environmental or RECE policy (even 1–2 pages)? • Is someone formally responsible for energy, water, waste and compliance?
<i>Resource Use (Energy, Water, Materials)</i>	• Are electricity and water consumption measured at least monthly? • Are there efforts to reduce wastage (leak repair, efficient lighting, process control)?
<i>Chemical Safety</i>	• Is there a list of all chemicals used (name, purpose, basic risk)? • Are Material Safety Data Sheets (MSDS) available and workers trained on safe use? • Are banned or highly hazardous chemicals avoided where possible?
<i>Pollution Control</i>	• Are effluent treatment systems (ETP/CETP) correctly used and maintained where applicable? • Are air, noise and dust managed (chimneys, enclosures, filters, dust extraction)?
<i>Closed-Loop & Circular Practices</i>	• Is textile waste segregated at source (fibres, yarn, fabric, garments; spinnable vs non-spinnable)? • Are there partnerships with recyclers, waste pickers, SHGs or cluster facilities? • Is any recycled content used in products, or are there pilots underway?

Areas & guiding questions

Environmental Pillar – Template

Area	Score (0–3)	Current Practices	What can be improved?	Challenges / Risks	Responsible & Timeline
Environmental Policy & Responsibility					
Resource Use (Energy/Water/Materials)					
Chemical Safety					
Pollution Control					
Closed Loop / Circular Practices					

Legal Pillar – Labour, Child Protection & Compliance

Labour Law Compliance

Child Protection & Young Workers

Contracts & Documentation

Payroll & Social Security Compliance

Areas & guiding questions

- Is the unit registered under applicable labour laws?
- Are attendance, wage payments, leave and overtime recorded and compliant?

- Are there clear rules to not employ children below legal age in any part of operations?
- Are age proofs collected and verified for all workers?
- If adolescents (above minimum age) are employed, are they protected from hazardous work?

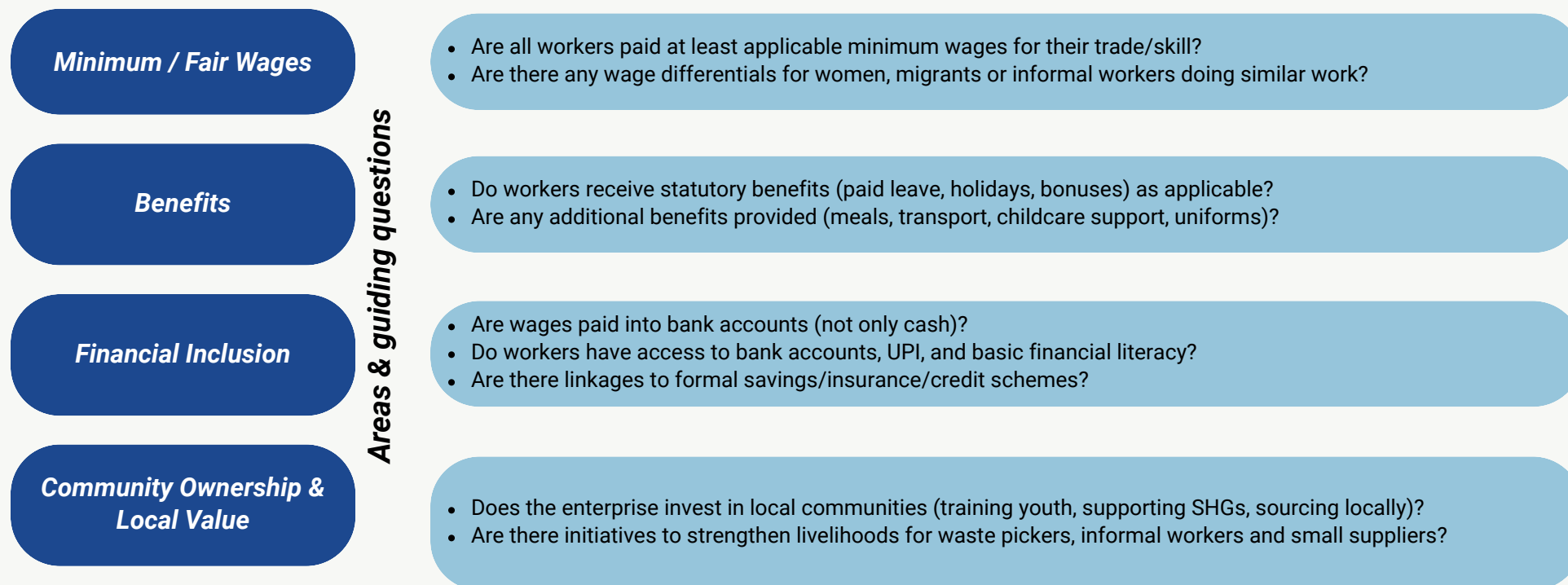
- Do workers have written appointment letters or contracts?
- Are key policies (safety, harassment, working hours) documented and accessible?

- Are wages at least minimum wage for respective skill category?
- Are EPF/ESI or other social security contributions made where applicable?
- Are payslips and records maintained and shared with workers?

Legal Pillar – Template

Area	Score (0–3)	Current Practices	What can be improved?	Challenges / Risks	Responsible & Timeline
Labour Laws					
Child Protection					
Contracts & Documentation					
Payroll & Social Security					

Financial Pillar – Worker Earnings, Benefits & Enterprise Stability



Financial Pillar – Template

Area	Score (0–3)	Current Practices	What can be improved?	Challenges / Risks	Responsible & Timeline
Minimum / Fair Wages					
Benefits					
Financial Inclusion					
Community Ownership					

From Assessment to Action: Prioritising and Following Through

After all four pillars are completed:

1

Identify priorities

- Ask the group: If we can improve only 3–5 things in the next 12 months, what should they be?
- Prioritise actions that:
 - Reduce clear legal or safety risk
 - Benefit a large number of workers
 - Support circular initiatives

3

Review periodically

- Review progress on the action plan at least once every 6–12 months.
- Repeat the scoring after one year to see where scores have improved.
- Use this to demonstrate progress to buyers, scheme authorities or cluster associations.

2

Create a simple C-SELF Action Plan

Priority Action	Pillar	Description of change	Lead person	Support needed (e.g. scheme, buyer, NGO)	Target date

Example layout

Priority Action	Pillar	Description of change	Lead person	Support needed (e.g. scheme, buyer, NGO)	Target date
Issue written contracts to all workers	Legal	Prepare simple appointment letters in Hindi etc	HR/Admin	Labour consultant, sample formats	3 months
Provide PPE to all waste sorters	Social / Env	Gloves, masks, safety briefing weekly	Supervisor	Vendor, small CAPEX assistance	1 month
Open bank accounts for all workers	Financial	Facilitate KYC, link to Jan-Dhan / local bank	Accounts	Bank partner, NGO support	4 months

2.7.10 ADDITIONAL READINGS AND RESOURCES

ILO Women and men in the informal economy: a statistical picture → [Here](#)

SEWA Udyam Registration for informal sector → [Here](#)

WIEGO Formalising the Informal → [Here](#)

Circularity Radar → [Here](#)



2.8 Environmental and Regulatory Compliances

2.8 ENVIRONMENTAL AND REGULATORY COMPLIANCES

2.8.1. Global RE-CE Compliances.....208

2.8.2. National RE-CE Compliances.....210

2.8.3. Environmental Laws and Acts.....213

2.8.1 GLOBAL RE-CE COMPLIANCES

EU Regulatory Landscape

Eco-design for Sustainable Products Regulation (ESPR)

Textiles to be designed for durability, repairability, and recyclability; bans destruction of unsold stock.

Corporate Sustainability Reporting Directive (CSRD)

Brands importing must disclose supply chain impacts, passing pressure to MSMEs.

EU Waste Framework Directive & EPR for Textiles (2025)

EU's revised Waste Framework Directive makes EPR mandatory for textiles, requiring brands to fund collection and recycling, driving demand for supplier partnerships in circular waste management.

Digital Product Passports (DPPs)

For textile item sold in EU data on origin, composition, recyclability, and environmental footprint needed.

Corporate Sustainability Due Diligence Directive (CSDDD)

Obligates global brands to enforce environmental and human rights standards across their supply chains.

Carbon Border Adjustment Mechanism (CBAM)

Though focused on steel/cement, such mechanism for emissions disclosure exists where energy-intensive MSMEs/industries will need cleaner production.

Buyers, Brands, and Market Driven Requirements

Brand Commitments: Global fashion brands (H&M, Zara, Adidas, etc.) have pledged high percentages of recycled or sustainable fibres by 2030. They push suppliers to integrate waste recovery, traceability, and circular inputs.

Second-Hand & Rental Growth: The second-hand apparel market in India is expected to grow 15–20% Compound annual growth rate (CAGR), and globally it may outpace fast fashion by 2030. Export-oriented MSMEs can supply to these channels with upcycled or repurposed products.

Green Consumer Segments: Younger consumers in EU/US (Gen Z, Millennials) demand transparency, sustainable sourcing, and proof of recycled content.



Market Access
Conditionality



Investment
Needs



Collaborative
Advantage



Opportunity for
Niche Markets

Implication for MSMEs

Compliance is not optional but a passport to future markets, particularly in the EU. Waste, both pre- and post-consumer, is at the centre of this transition, making traceability, recycling integration, and alignment with RECE frameworks essential.

2.8.2 NATIONAL RE-CE COMPLIANCES

Current Waste Landscape

Solid Waste Management Rules, 2016

Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016

Plastic Waste Management Rules (EPR 2022)

Core Environmental and Textile Specific Compliances

Environment (Protection) Act, 1986 & Rules

Permits (Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981)

Textile-specific: Effluent Standards & ZLD Expectations

Solid Waste Management Rules, 2016

- Mandates source-level segregation of waste at units (biodegradable, recyclable, non-recyclable, domestic hazardous).
- MSMEs handling textiles must keep records of waste generated, collected, and sent to authorised recyclers.
- Textile waste (cuttings, rejects, packaging, etc.) falls under dry/recyclable waste – cannot be mixed with general waste.
- Penalties for non-compliance include fines under the Environment (Protection) Act.

Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016

- Applies where dyes, chemicals, solvents, sludge, or hazardous packaging are generated.
- MSMEs must:
 - Register with State Pollution Control Boards as hazardous waste generators.
 - Maintain manifests for storage, handling, and transport.
 - Use authorised transporters and TSDFs (Treatment, Storage & Disposal Facilities).
- For import/export of textile waste (like PET flakes, post-consumer textiles), strict MoEFCC approval and Basel Convention compliance applies.

Plastic Waste Management Rules, 2022

- Mandates registration of all users/importers of plastic packaging on CPCB's EPR portal.
- MSMEs must declare annual use of polybags, mailers, tapes, and other plastic packaging.
- Obligated to meet recycling and recycled-content targets as notified.
- Must file returns on plastic collection, recycling, and disposal.
- Penalties for non-compliance include fines and cancellation of registration.

Environment (Protection) Act, 1986 & Rules

- Umbrella law setting national emission and effluent discharge standards.
- MSMEs must ensure compliance with CPCB/SPCB standards for water, air, and chemical discharge.
- Requires annual submission of Environmental Statement (Form-V).
- Non-compliance can lead to closure notices, heavy penalties, and prosecution.

Permits

- Mandatory permits under Water (1974) and Air (1981) Acts.
- CTE required before setting up a textile unit; CTO required before operations begin.
- Issued by State Pollution Control Boards (SPCBs); validity typically 3–5 years.
- MSMEs must maintain compliance records and submit monitoring data.
- Operating without valid CTE/CTO is considered illegal and attracts closure orders.

Textile-specific: Effluent Standards & ZLD Expectations

- Textile effluent standards notified under Environment (Protection) Rules, 2016 (Amendment).
- Zero Liquid Discharge (ZLD) mandated in clusters like Tiruppur and Tamil Nadu.
- MSMEs must pre-treat effluents before discharge to CETPs or recycle wastewater in ZLD areas.
- Applies to dyeing, bleaching, and wet-processing units.
- Non-compliance can result in unit closure by SPCBs, permit withdrawal.

2.8.3 ENVIRONMENTAL LAWS AND ACTS

Sustainable Bharat Textile Mission

The Sustainable Bharat Textile Mission (SBTM)¹² is a Government of India initiative to align the textile sector with circular economy and resource efficiency goals. The mission aims to:

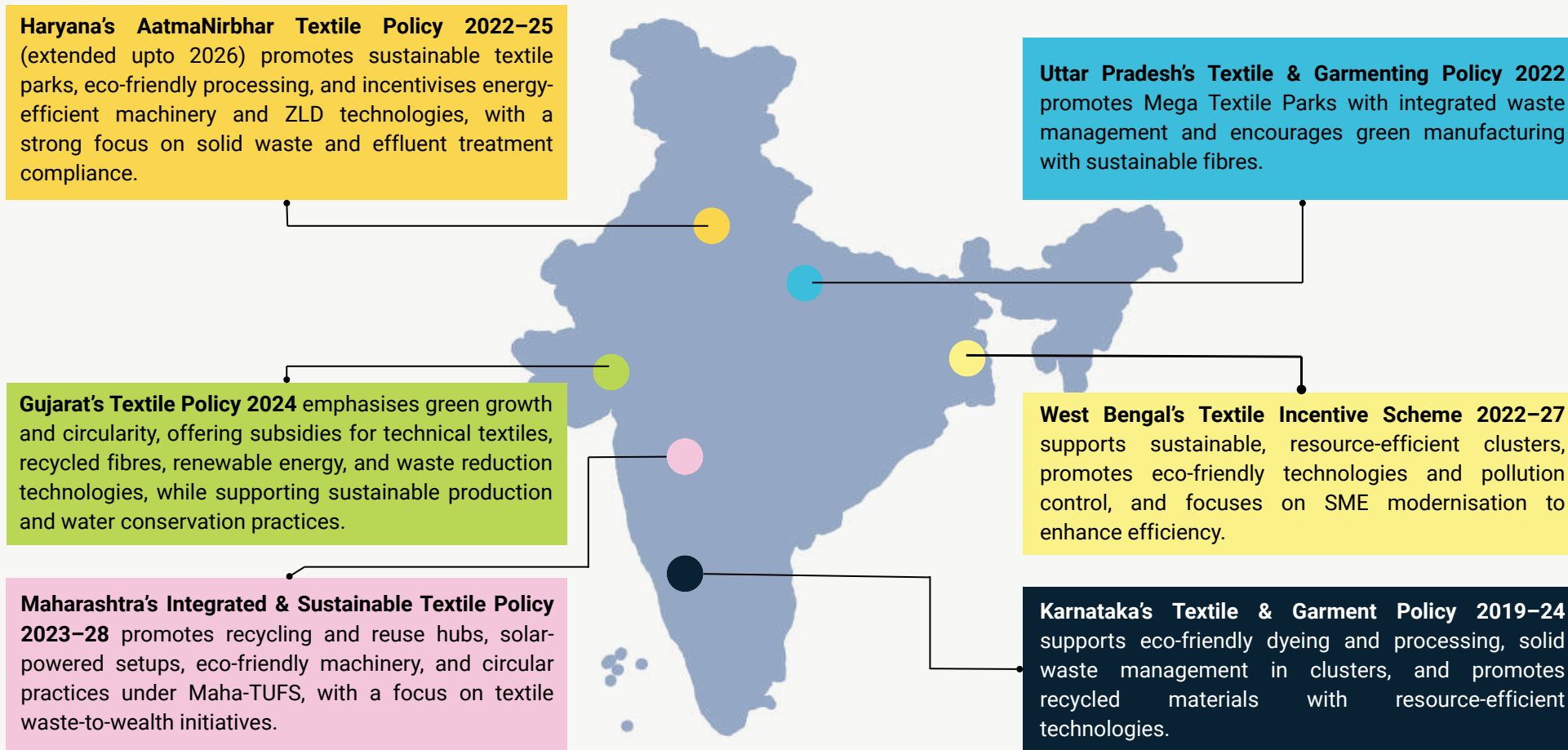
- Promote sustainable production through Centres of Excellence on Fashion and Textile Technology.
- Encourage innovation & start-ups to scale green solutions.
- Set up recycling hubs for pre- and post-consumer textile waste management.
- Incentivise efficient resource use across water, energy, and raw materials.
- Build a digital knowledge portal for research, compliance, and industry best practices.

It serves as an umbrella framework to make Indian textiles globally competitive, environmentally sustainable, and socially responsible.



12. Ministry of Textile, 3rd ESG Taskforce Meeting: [Sustainable Bharat Textile Mission](#)

State Level Textile Sector Policy for Sustainability



*The geographical map used is for informational purposes only and does not constitute recognition of international boundaries or regions.
GIZ makes no claims concerning the validity, accuracy or completeness of the maps nor assumes any liability resulting from the use of the information therein.*



2.9 Monitoring, Evaluation and Certification

2.9 MONITORING, EVALUATION AND CERTIFICATION

2.9.1. Introducing Monitoring, Evaluation & Certification.....	217
2.9.2. RE-CE-focused KPIs for textile waste MSMEs.....	218
2.9.3. Monitoring & Evaluation Dashboard for Operations.....	222
2.9.4. Textile Committee’s ‘Upcyclers Certification’.....	226
2.9.5. Eco-Mark 2024 – Textile Sector.....	227
2.9.6. Zero Defect Zero Effect (ZED) Certification.....	228

2.9.1 INTRODUCING MONITORING, EVALUATION & CERTIFICATION

Turning circularity from concept to measurable, marketable impact

- Monitoring & Evaluation (M&E) helps MSMEs measure how well they are using resources, reducing waste, and creating value.
- Certification proves these achievements to buyers, regulators, and investors.
- Together, they ensure data-driven improvement and market credibility in the textile waste sector.

Need: In a competitive and regulated market, MSMEs must back sustainability claims with evidence. M&E provides the proof, and certification turns it into a recognised, market-ready advantage.



Image Source: Conserve India

2.9.2 RE-CE-FOCUSED KPIS FOR TEXTILE WASTE MSMES

KPIs: What They Are & Why They Matter

Key Performance Indicators (KPIs) are specific, measurable metrics that track how well your business is achieving its goals. In textile waste recycling, KPIs can cover environmental impact, operational efficiency, financial performance, and social inclusion.

- **Decision-Making Tool:** KPIs give a clear picture of what's working and where to improve (e.g., high water use in washing stage).
- **Proof for Buyers & Regulators:** Buyers increasingly demand evidence of sustainability—KPIs give you credible numbers to show in tenders, ESG reports, and certification audits.
- **Market Differentiator:** Being able to say “Our recycled yarn saves 60% water vs virgin” sets you apart from competitors.
- **Cost Control & Profitability:** Tracking resource use and yields can reveal wastage and save money.
- **Funding & Incentives:** KPIs provide the impact data needed for green financing, cluster subsidies, or CSR partnerships.



MSME Tip

Start small—track 3–4 KPIs that matter most to your buyers or processes, then expand once you're confident in your data collection.

Resource Efficiency KPIs

Measuring how efficiently MSMEs turn textile waste into value while minimising resource use

Indicator	Description
Material Recovery Rate	% of textile waste input converted into usable recycled output (e.g., fibre, yarn, fabric)
Specific Energy Consumption	Energy used per kg of recycled product (kWh/kg)
Specific Water Consumption	Water used per kg of waste processed (litres/kg), including washing stages
Sustainable Chemical Use Intensity	Amount of chemicals per kg processed, prioritising safe/green alternatives
Waste Diversion Rate	% of total textile waste prevented from going to landfill or incineration
Production Yield	% of waste input that becomes finished recycled goods, factoring process loss
Process Optimisation Index	No. of process steps improved annually for efficiency in recycling
Resource Cost Savings	Annual cost saved from reduced water, energy, or input material use in recycling

Why it Matters

Tracking RE KPIs lowers operating costs by reducing waste, water, and energy bills, improving compliance with environmental regulations and attracts eco-conscious buyers.

Circular Economy KPIs

Tracking how well MSMEs close the loop and extend product life cycles

Indicator	Description
Recycled Content Share	% of recycled fibre in final products (by weight)
fibre-to-fibre Recycling Rate	% of recovered fibre re-used in making new textiles (vs. downcycled uses)
Take-Back Collection Rate	% of products returned under take-back or extended producer responsibility (EPR) schemes
Virgin Material Avoidance	Tonnes of new raw material avoided by using recycled textile inputs
Carbon Emissions Avoided	CO ₂ e saved compared to equivalent virgin production
Product Reuse/Upcycling Rate	% of waste transformed into new products of equal or higher value
Number of brands/suppliers engaged in return	recycle–reuse agreements
Innovation Index	Number of new recycled products, materials, or processes launched annually

Why it Matters

Tracking CE KPIs shows buyers your commitment to circularity beyond efficiency, opening up access to niche markets for 100% recycled or closed-loop products along with reducing dependency on virgin raw materials.

Social & Compliance KPIs for RE-CE

Ensuring people, safety, and standards are part of the recycling loop

Indicator	Description
Workforce Inclusion Rate	% of women, migrant workers, or marginalised groups in total workforce
Income Improvement Index	% increase in average worker wages compared to baseline or local minimum wage
Health & Safety Compliance Rate	% of workers with PPE, safety training, and accident-free workdays
Training Hours on RE-CE Skills	Average annual hours of upskilling for recycling, sorting, and circular production processes
Certification Coverage	Certified under recognised sustainability or safety standards (e.g., GRS, ISO 14001, SA8000)
Supplier Compliance Rate	% of suppliers meeting agreed social, environmental, and chemical management criteria
Legal Compliance Score	Number of valid permits, licenses, and regulatory filings maintained on time
Worker Voice Mechanisms	Existence and use of grievance redressal, worker committees, or participation in decision-making

Why it Matters

Tracking social and compliance KPIs builds trust with socially responsible buyers and financiers, reducing risk of audit failures and non-compliance penalties along with positions MSMEs as ethical and future-ready partners in global supply chains.

2.9.3 MONITORING & EVALUATION DASHBOARD FOR OPERATIONS

Objective of the Dashboard

A simple, visual tool for MSMEs to track Resource Efficiency & Circular Economy (RE-CE) performance, turning numbers into actionable insights. The image representation is an hypothetical visualisation of such monitoring and evaluation dashboards that MSMEs can create for real time updates.

The dashboard allows MSMEs to:

- Shows progress against targets and industry benchmarks.
- Helps identify quick wins and problem areas at a glance.
- Supports better, faster operational decisions without costly systems.

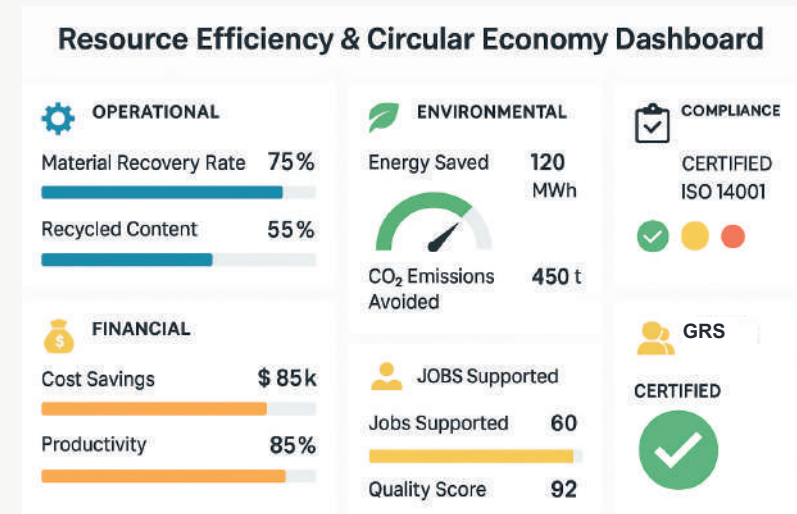


Image Source: AI generated

Key Features for MSMEs:

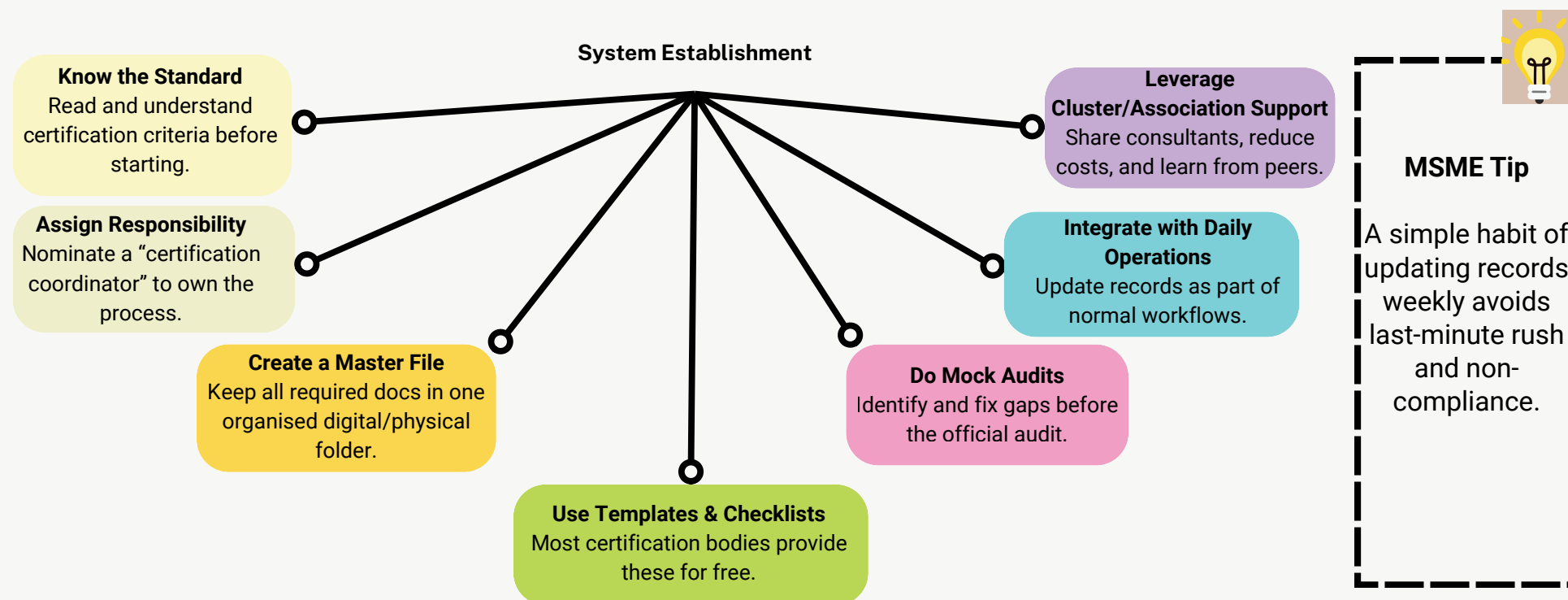
- All KPIs in One Place – operational, financial, environmental, social, compliance.
- Easy to Update – monthly or quarterly in Excel, Google Sheets, or simple BI tools.
- Trend Tracking – compare current vs. past performance to see improvements or declines.
- Traffic Light Indicators – red/amber/green signals for quick action.
- Responsibility Mapping – assign who records each metric (production, HR, EHS).
- Decision-Ready – use data to guide process changes, equipment upgrades, or training needs.

Certification-Linked Documentation: What to Keep Ready

Traceability & Material Flow	• Batch records of recycled fibres/yarns (supplier name, % recycled, certificates). • Production logs linking waste inputs to fabric/yarn outputs. • Transaction Certificates (GRS/RCS, chain-of-custody).	 MSME Tip Keep a “Certification File” (physical or digital) for each standard (GRS, ISO 14001, ZED, SA8000) with clearly labeled folders for the above categories. Update monthly to stay audit-ready.
Process & Quality Control	• SOPs for waste segregation, dyeing, and recycling. • Lab test results: fibre composition, colour fastness, chemical safety. • Calibration records for dyeing/recycling machines.	
Environmental Compliance	• Pollution Control Board consents & effluent test reports. • ETP/ZLD/CETP discharge monitoring logs (where applicable). • Resource use data: water per kg fabric, energy consumption. • Plastic Waste Management (PWM) records: Tie-ups/MoUs with authorised recyclers, waste management agencies, or cement co-processing plants; copies of EPR registration or disposal certificates where applicable.	
Social & Worker Welfare Records	• Worker age & wage verification records (esp. home-based/contract workers). • Safety training attendance, PPE issuance, and accident logs. • Gender & inclusion records (e.g., participation of women in sorting).	
Legal & Regulatory Proof	• Factory license, GST, MSME/Udyam certificate. • Hazardous waste disposal receipts (e.g., sludge, chemicals). • Insurance documents for premises & workforce.	

Setting Up an Audit-Ready System

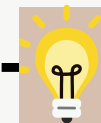
Practical, low-cost steps for MSMEs to stay prepared for certification and compliance audits year-round—ensuring no last-minute scramble and building credibility with buyers, regulators, and investors.



Documents Required for Certification & Compliance

A ready-to-use checklist of critical documents MSMEs in the textile waste recycling sector must maintain to meet standards like GRS, ISO 14001, ZED—helping prove traceability, legal compliance, and sustainability claims.

Company Details	Registration papers, GST number, Udyam/MSME certificate
Annual Reports	Last 2–3 years of company performance (if applicable)
Recycling/Disposal Agreements	Signed contracts with authorised recyclers or disposal vendors
Waste Audit Reports	Internal or third-party analysis of waste streams handled
Legal & Regulatory Proof	- Factory licence, GST registration, MSME/Udyam certificate - Hazardous waste disposal receipts - Insurance documents (workforce & premises)
EPR Action Plan	Document outlining your Extended Producer Responsibility compliance steps
Plastic/Textile Waste Consumption Data	Monthly or annual material usage records
Consent Certificates	Air/water consent from State Pollution Control Board
Process Flow Diagram	Visual showing your recycling operations and control points



MSME Tip

Use a certification document checklist and update it monthly – it becomes your quick “audit pass”.

2.9.4 TEXTILE COMMITTEE'S 'UPCYCLER CERTIFICATION'

Registration of upcycled circular product manufacturer on GeM

A tripartite [MoU](#) has been signed between Textiles Committee (TC), Government E-Market Place (GeM), and Standing Conference of Public Enterprises (SCOPE) with the following objectives:

- **Promotion of upcycled products** in public procurement on GeM platform
- Design and implement **inclusive, fair, and sustainable** interventions
- Promoting **women empowerment** and **green livelihoods** generation
- **Market Access** to established and emerging Upcyclers in India

- Nodal Agency for Certification → Textile Committee
- Registered As → Upcycled Textile Manufacturers
- Apply to → Nearest Regional Office of Textile Committee
- Charges → Rs 5,000 + G.St

Process

Connect with Regional Office → Document Filling & Submission → Fees Payment → On-site verification → Certificate Issued



Image Source: Textile Committee
Sample Certificate

Click here to know more:
<https://textilescommittee.nic.in/registration-upcycled-circular-product-manufacturer>

2.9.5 ECO-MARK 2024 - TEXTILE SECTOR

Sustainable Labelling for Environmentally Friendly Textiles

Overview & Governance		Key Environmental Criteria – Textiles	
• The Eco-Mark is an environmental certification by the Bureau of Indian Standards (BIS) under MoEFCC. • New Ecomark Rules, 2024 (replacing 1991). • Jointly governed by CPCB & BIS. • Covers 17 categories, incl. textiles. • Aligned with LiFE mission.		• Use organic/sustainable fibres; no toxic residues. • Ban on azo dyes; limit heavy metals. • Keep formaldehyde within safe limits. • Restrict chlorine; prefer oxygen bleaching. • Effluent treatment per CPCB/Zero Liquid Discharge where applicable.	
Benefits	Market differentiation & brand value for eco-conscious buyers	Alignment with EU Ecolabel, GOTS, aiding export readiness	Supports compliance with EU Green Deal, CBAM, CSRD
			Enhances sustainability credentials

Click here to know more: https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/ecomark/isdetails/MTY=

2.9.6 ZERO DEFECT ZERO EFFECT (ZED) CERTIFICATION

Launched by the Ministry of MSME launched under the "**Make in India**" and "**Atmanirbhar Bharat**" campaigns, the ZED scheme encourages MSMEs to manufacture goods with:

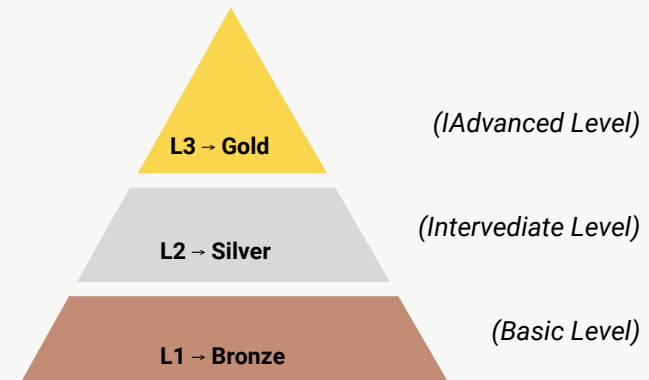
- "**Zero Defect**" (no rejections, meeting quality standards).
- "**Zero Effect**" (no adverse impact on environment).

Eligibility - All MSMEs registered with the UDYAM registration portal

The Scheme Promotes

- Resource-efficient manufacturing (less waste/defects).
- Green tech, cleaner production, sustainable processes.
- Alignment with RE-CE principles.

Certification Levels



Incentives

- Subsidy support for MSMEs to obtain ZED certification.
- Extra subsidy for women/SC/ST, special regions & SFURTI/MSE-CDP MSMEs.

Steps for Certification

After the ZED Pledge, MSMEs can apply online for certification covering quality, safety, energy, and environment.

MSME ZED Certification

About ZED Certification → About Scheme: <https://zed.msme.gov.in/introduction>

Scheme Portal → MSME Sustainable (ZED) Certification: <https://zed.msme.gov.in/>

Additional Readings → For MSMEs: <https://zed.msme.gov.in/documents>

ZED Model and Standard → [https://zed.msme.gov.in/uploads/MSME_Sustainable_\(ZED\)_Model_and_Standard.pdf](https://zed.msme.gov.in/uploads/MSME_Sustainable_(ZED)_Model_and_Standard.pdf)

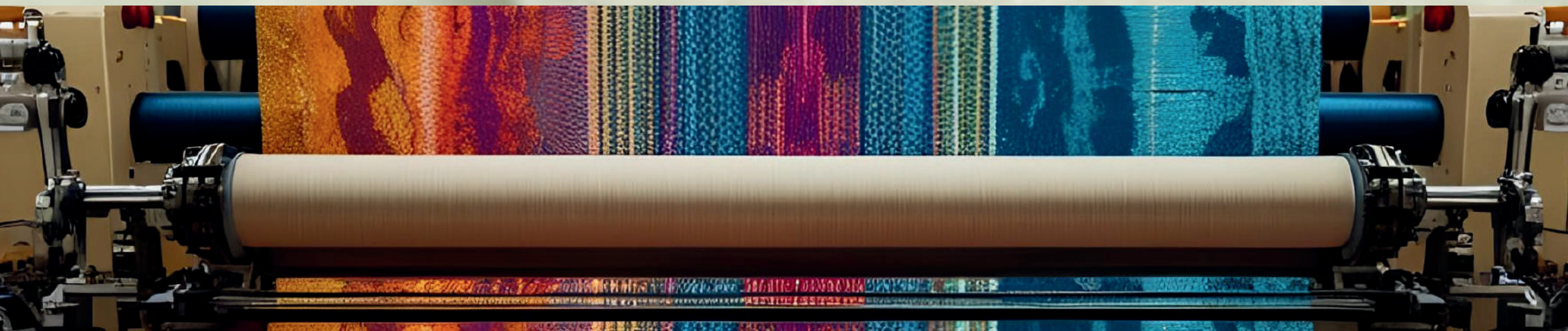
ZED Assessment Checklist →

Silver ([https://zed.msme.gov.in/uploads/MSME_Sustainable_\(ZED\)_Assessment_Framework_Silver.pdf](https://zed.msme.gov.in/uploads/MSME_Sustainable_(ZED)_Assessment_Framework_Silver.pdf))

Gold ([https://zed.msme.gov.in/uploads/MSME_Sustainable_\(ZED\)_Assessment_Framework_Gold.pdf](https://zed.msme.gov.in/uploads/MSME_Sustainable_(ZED)_Assessment_Framework_Gold.pdf))

ZED Guidance Document → NIC DIVISION 13 – Manufacture of Textiles

https://zed.msme.gov.in/uploads/ZED_Guidance_Document_NIC_Division_13.pdf



3 SCHEMES, SUPPORT, AND COLLABORATIONS FOR RE-CE

3. RE-CE PROGRESS FOR SCHEMES, SUPPORT & COLLABORATIONS

3.1 MSE-GIFT Scheme	232
3.2 MSE-SPICE Scheme	234
3.3 MSME Champions Scheme	236
3.4 Skill India Mission.....	237
3.5 Support & Collaborations	238

3.1 MSE-GIFT SCHEME

MoMSME's MSME-GIFT (Green Investment and Financing for Transformation) Scheme

- Aims to make institutional finance is made available to MSEs at a concessional cost.
- Support MSEs in accessing finance for adopting clean / green technologies and sustainable business operations
- Target Beneficiaries → Micro and Small Enterprises (MSEs)

Key features and Benefits

- Interest subvention and credit guarantee support.
- Assistance in implementing green technology.
- Implemented by SIDBI (Small Industries Development Bank of India).
- Credit-linked capital subsidy.

[Read More...](#)

[About
MSE-GIFT](#)

[Scheme Short
Video](#)

[Green
MSE Portal](#)

[FAQs For
Beneficiaries](#)

[GIFT
Brochure](#)



Image Source: MoMSME

MoMSME's MSME-GIFT Scheme: Modalities & Financing Details

Scheme Components:

Green Tech Upgrade: Credit-linked capital subsidy.

Cluster Support: Common Facility Centers (CFCs) for shared green infra.

Innovation Pilot Grants: Up to 20% subsidy for demonstration projects.

Eligible Activities:

- Energy-efficient machinery & low-impact processing units.
- Water recycling, ETPs, and zero-liquid discharge systems.
- Waste segregation, collection, and recycling infrastructure.
- Resource-efficient production and digital traceability tools.

Financing Structure:

- Loan Tenure: Up to 5 years.
- Interest Rate: 6–8% post-subsidy (depending on credit rating and sector).
- Credit Guarantee: Up to ₹2 crore under CGTMSE.
- Maximum Assistance: ₹1 crore per MSME for machinery/technology retrofit.
- Refinance Support: Provided by SIDBI to NBFCs and MFIs lending to MSMEs.

Application Process: Online application → Project appraisal by SIDBI → Verification → Disbursement.

3.2 MSE-SPICE SCHEME

MoMSME's MSME-SPICE (Scheme for Promotion and Implementation of Circular Economy) Scheme):

- Aims to accelerate adoption of RE-CE practices among MSMEs through funding support (piloting, technology upgrades, and collaborative models).
- Support MSMEs in implementing interventions in high-waste sectors like textiles, through financial assistance, technical guidance, and market linkages.
- Target Beneficiaries → MSMEs (incl recycling units, waste aggregators, and manufacturers).

Key features and Benefits

- Direct funding support (grant-in-aid) for RE-CE initiatives.
- Encourages collaboration with industry bodies, NGOs, and R&D institutes.
- Focus on scalable and replicable models/projects.



Image Source: Ministry of MSME

Click the links to
Read More...

[About
MSE-SPICE](#)

[Scheme Short
Video](#)

[Green
MSE Portal](#)

[FAQs For
Beneficiaries](#)

[SPICE
Brochure](#)

MoMSME's SPICE Scheme – Modalities & Financing Details

Eligible Activities:

- Circularity pilots (remanufacture, reuse, waste valorisation).
- Demonstration of cluster-level waste recovery models.
- Technology testing, digital circular tracking, or shared recycling infrastructure.
- Development of sustainable business plans aligned with Mission LiFE.

Financial Assistance:

- Grant Support:
 - Up to ₹50 lakh for individual MSMEs.
 - Up to ₹2 crore for cluster/consortium projects.
- Cost-Sharing: 80:20 (Government: MSME).
- Project Duration: 12–24 months.
- Special Category Priority: Women-led, SC/ST, and ZED-certified units.

Implementation & Evaluation:

- Managed through SIDBI and MoMSME Green Portal.
- Technical Evaluation Committee (TEC) reviews proposals.
- Post-project performance monitored via ZED/RE–CE dashboard.

3.3 MSME CHAMPIONS SCHEME

MoMSME's Integrated Scheme for Technology, Finance, and Market Support

- Aims to help MSMEs sustain, grow, and compete globally
- Handholding and helping MSMEs in their navigation of various government schemes/policies
- Providing integrated support (quality, technology, access, and grievance)
- Embedding sustainability and digital transformation
- Target Beneficiaries → All MSMEs

Key Components

- MSME-Sustainable (ZED)
- MSME-Innovative(for Incubation, IPR, Design)
- MSME-Competitive (Lean) (Yet to be launched)
- Digital MSME (Yet to be launched)

Click the links to
Read More...

[MSME Champion
Portal](#)

[Scheme
Information](#)

[MSME Champion
Portal](#)

[ZED
Certification](#)

[MSME
Innovative](#)



Image Source: Ministry of MSME

3.4 SKILL INDIA MISSION

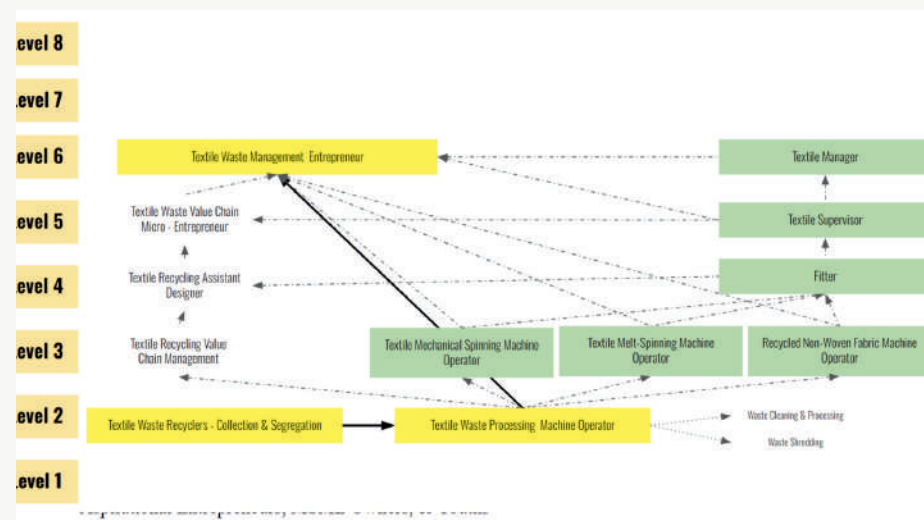
Upskilling Courses for Textile Waste Recycling

To create textile waste recycling courses for the 'Textile Sector Skill Council' that aims to equip workforce for jobs in textile industry circular economy.



Upskilling Stakeholders

- Informal Waste pickers & aggregators
- Workers in Textile recycling MSMEs
- Textile Recovery Facilities & SHGs
- Aspirational Entrepreneurs, MSME Owners, & Youths



Career Progression



Courses Created

Image Source: Textile Sector Skill Council

3.5 SUPPORT & COLLABORATIONS

SU.RE - Sustainable Resolution



Indian Apparel Industry's largest voluntary commitment to sustainability is an initiative by the Clothing Manufacturing Association of India (CMAI), Reliance Brands Limited (RBL), UN in India, and The Ministry of Textiles India.

It aims to catalyse the industry's transition towards sustainability.



Image Source: SU.RE

Circular Design Challenge (CDC)

CIRCULAR DESIGN CHALLENGE

India's first and largest sustainability award in fashion, launched at Lakmé Fashion Week in 2019. A joint initiative of the R|Elan™ - Fabric 2.0, Lakmé Fashion Week, and United Nations Environment Programme (UNEP). Promote circular design practices by supporting designers and start-ups using waste, upcycled, or alternative sustainable materials. Winners receive financial support, mentorship, and visibility through showcases, retail linkages, and investor connects.

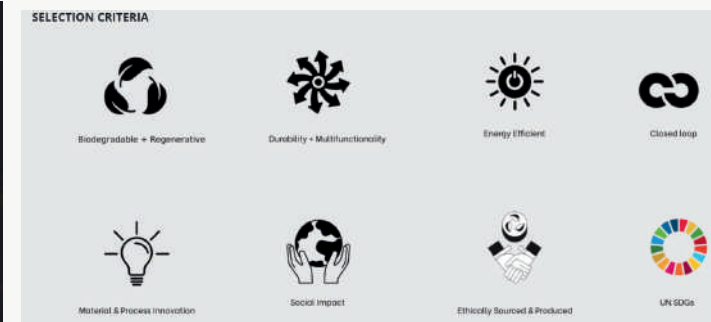


Image Source: Circular Design Challenge

Upaya Social Ventures Accelerator



Focusing on supporting early-stage social enterprises that create jobs for people living in extreme poverty, Upaya Social Ventures Accelerator provides a 3–4 month accelerator program with seed funding, mentorship, and investment readiness support, working across sectors including textiles, artisan livelihoods, and waste management.



Image Source: Upaya Social Ventures Accelerator

Fashion for Good Accelerator



A global innovation platform based in Amsterdam with hubs in India, Europe, and Asia. It runs accelerator programs supporting innovations in sustainable materials, recycling, traceability, and clean production, offering funding, mentorship, and pilots with leading fashion brands. The India Hub (launched 2020) supports start-ups in textile waste, bio-based materials, and water/energy reduction.

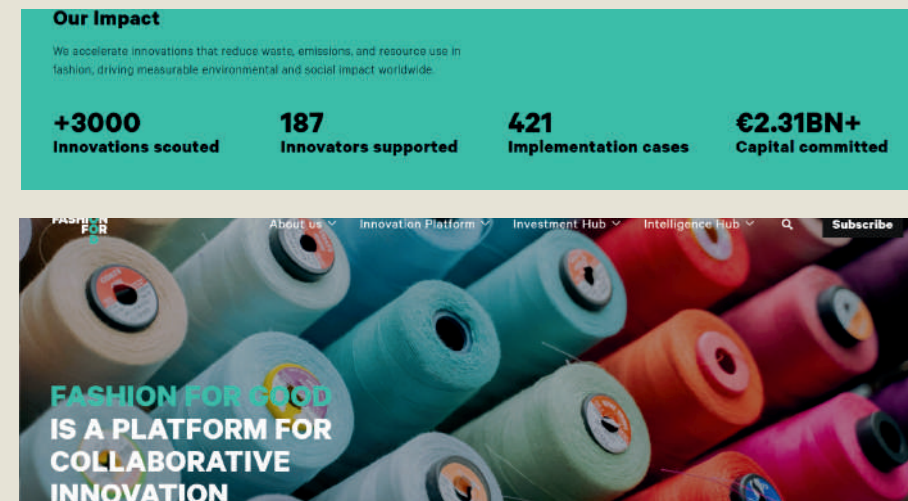


Image Source: Fashion for Good



4 WASTE AUDIT CHECKLIST

4. WASTE AUDIT CHECKLIST

4.1. Material Inflow–Outflow Tracking	242
4.2. What to Track	243
4.3. Process Loss Mapping & Sorting Errors	244
4.4. Daily Waste Categorisation Log	245
4.5. Weekly Waste Categorisation Log	246

4.1 MATERIAL INFLOW-OUTFLOW TRACKING

Track every kilogram of material entering and leaving your facility to identify efficiency gaps and circularity opportunities.

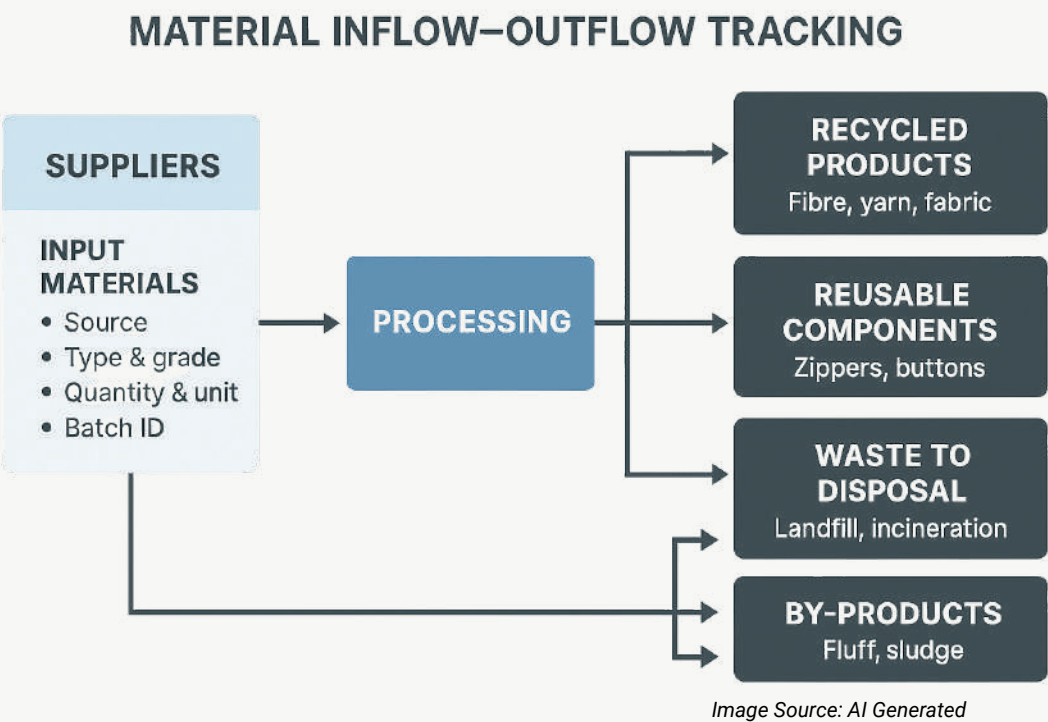
Purpose for MSMEs

Ensures accurate measurement of waste handled, recycled, or disposed.

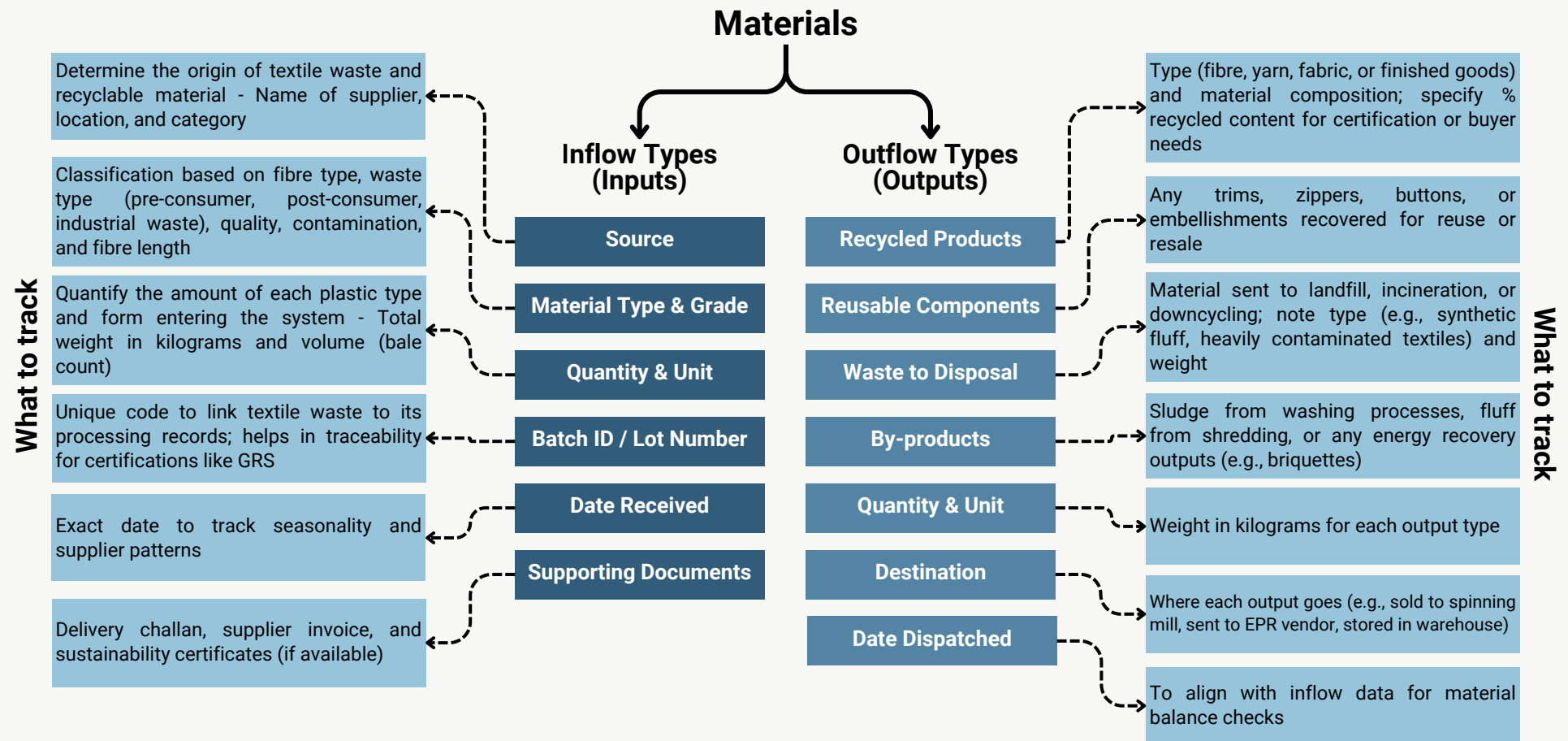
Provides a baseline for efficiency improvement and resource planning.

Helps in certification readiness (GRS, ISO 14001) by maintaining traceable records.

Supports EPR compliance and sustainability reporting.



4.2 MATERIAL TRACKING: WHAT TO TRACK



4.3 PROCESS LOSS MAPPING & SORTING ERRORS

Identifying where resources leak in the recycling chain to boost recovery rates and profitability:

Process Loss Mapping

1 Collection	→ Poor segregation at source causes recyclable textiles to mix with other waste	→ Impact: Reduced recovery rate; extra labour for re-sorting
2 Transportation	→ Transit related material loss or damage due to torn bags, open trolleys, or poor weather protection	→ Impact: Weight loss, contamination, or unusable materials
3 Processing	→ Inefficient shredders/sorting lines sending recoverable fibre to landfill	→ Impact: Higher process waste, lower yield from each batch



Sorting Errors



1 Incorrect Categorisation	→ Wrong fibre type classification (e.g., polyester treated as cotton)	→ Impact: Reduces purity of recycled output; limits market value
2 Contamination	→ Foreign materials (metal trims, food stains, moisture) reducing recyclability	→ Impact: Entire batch may be rejected or downcycled
3 Inadequate Training	→ Workers unaware of textile waste grades and handling protocols.	→ Impact: High error rate; more process waste

4.4 DAILY WASTE CATEGORISATION LOG

A simple, consistent record-keeping tool to track waste streams and improve recycling accuracy

Field	Example / Instructions
Date	e.g., 2025-07-12
Location / Area	e.g., Cutting Floor, Stitching Unit, Sorting Area
Waste Type	e.g., Pre-consumer cotton offcuts, polyester thread waste, mixed trims
Quantity (Weight/Volume)	e.g., 12 kg, 25 liters
Material Composition	e.g., 80% cotton / 20% polyester blend
Batch / Lot Number	Unique ID linked to production or sorting batch
Source	e.g., Generated from cutting line, collected from QC rejects
Recyclable (Yes/No)	If Yes, mention recycler name or recovery process
Non-Recyclable (Yes/No)	If Yes, mention disposal method (landfill, incineration)
Estimated Value	Optional – potential resale/recycling value (₹ or USD)
End Destination	Name and location of recycler, aggregator, or disposal site
Photo Reference (optional)	Attach photo in digital log for audit/DPP proof
Notes / Observations	e.g., Contamination found, unusual material, hazardous inclusion
Person Responsible	Name and designation of person logging the data

Purpose

To record and monitor the types, quantities, and sources of waste generated each day to identify trends, optimise processes, reduce contamination, and ensure traceability.

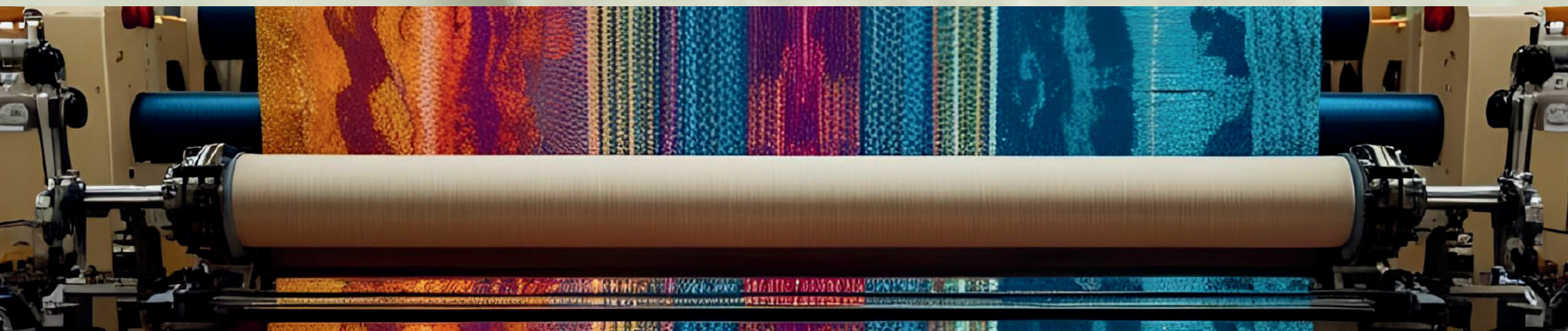
4.5 WEEKLY WASTE CATEGORISATION LOG

A simple, consistent record-keeping tool to track waste streams and improve recycling accuracy

Field	Example / Instructions
Week & Date Range	e.g., Week 28, 2025-07-07 to 2025-07-13
Total Waste Generated (kg)	Sum of daily logs – e.g., 520 kg
Breakdown by Waste Type	Cotton offcuts: 300 kg; Polyester waste: 150 kg; Mixed trims: 70 kg
Breakdown by Process Source	Cutting floor: 350 kg; Stitching line: 120 kg; QC rejects: 50 kg
% Recyclable	e.g., 85% (calculated from recyclable portion vs total)
% Non-Recyclable	e.g., 15%
Main Contamination Sources	e.g., Fabric with adhesive backing, oil stains from machines
Recovery Partners Used	Names & contact of recyclers/aggregators worked with that week
Revenue from Recyclables (₹)	Optional – e.g., ₹ 8,400 from selling fabric waste
Cost of Disposal (₹)	Optional – e.g., ₹ 1,200 paid to waste contractor
Compliance Notes	Deviations from waste handling SoPs or certification reqd
Operational Issues	e.g., Delay in waste pickup, storage overflow, sorter absenteeism
Improvement Actions Taken	e.g., Additional bins placed in cutting floor, sorter retrained
Prepared By	Name & designation of person compiling the weekly report

Purpose

To consolidate daily waste data into a weekly summary, identify trends, and flag operational or compliance issues. This log is useful for internal reviews, buyer reporting, and certification audits.



5 CASE STUDIES & CLUSTER BEST PRACTICES

5. CASE STUDIES & CLUSTER BEST PRACTICES

5.1. Panipat	249
5.2. Cluster Best Practices - Panipat.....	250
5.3. Tirupur	252
5.4. Cluster Best Practices - Tirupur.....	253

5.1 PANIPAT

Location: Haryana, ~90 km from Delhi NCR

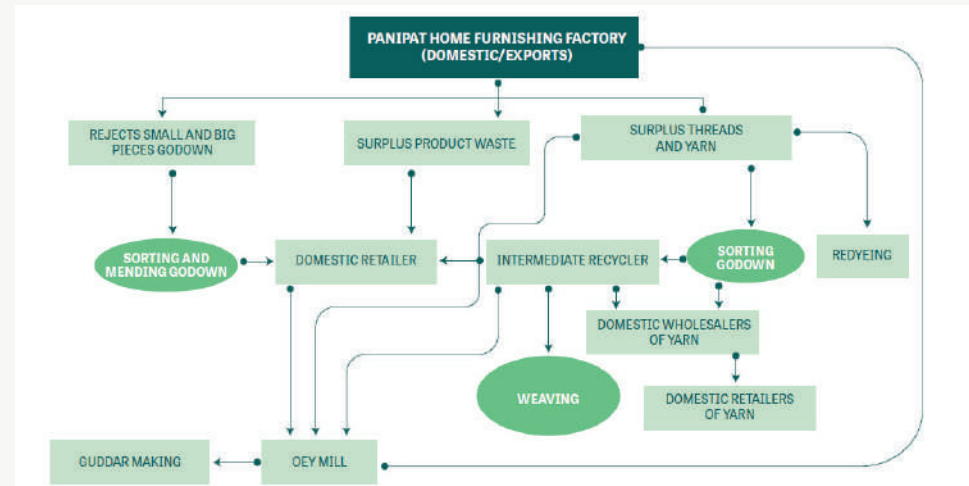
Known globally as the **“cast-off capital of India”** due to its large-scale processing of used clothes and post-consumer textiles.

Dominant products: shoddy yarn, blankets, carpets, mats, and durries made from recycled wool, cotton, and synthetics.

Over 350+ recycling MSMEs operate in Panipat, employing thousands of workers.

Panipat shows how waste = raw material at scale

Lessons for MSMEs: efficiency, value-addition, compliance, and traceability are critical for global market entry. With circularity and DPP requirements coming in EU, Panipat MSMEs can become leaders in circular exports if they modernise.



IDH, *Imperatives and Opportunities for Gendered Interventions in the Textile Waste Value Chain*, (2025)

Waste Streams Handled

- **Imported Post-Consumer Waste** --> used clothes, woollens, and synthetic garments (mainly EU/US imports).
- **Domestic Pre-Consumer Waste** → hosiery cuttings, mill waste, and fabric scraps.
- **By-products** → Fluff, sludge, dust, and unusable fibre residues.

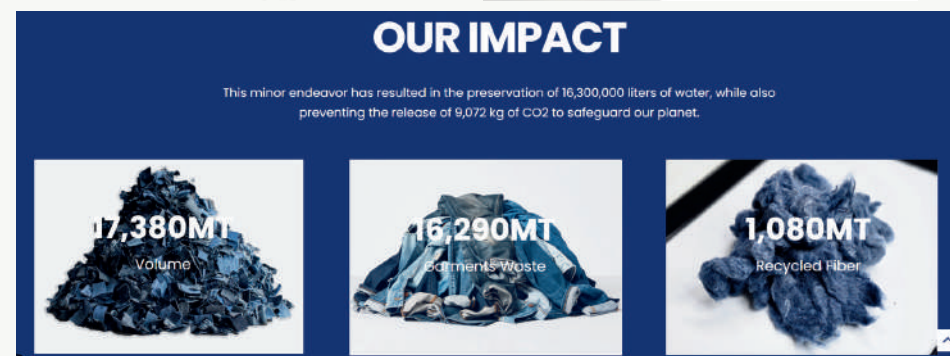
5.2. CLUSTER BEST PRACTICES - PANIPAT

Aadi Sustainability Solutions Pvt. Ltd.

Operates in the denim sector, focusing on waste-to-garment manufacturing. Integrates pre-consumer and post-consumer textile waste into denim production. Implements zero-waste, zero-liquid discharge (ZLD), and ZDHC (Zero Hazardous Chemical Discharge) practices.

Key Circular Practices:

- Converts denim waste into high-quality fibres and garments that can re-enter production cycles.
- Runs water recycling and effluent treatment systems to close water loops in production.
- Avoids hazardous chemicals, aligning with global buyer standards for safer supply chains.
- Scales recycled inputs into mainstream denim products, bridging recycling with commercial apparel markets.



Click Here to know more : <https://recyclr.org/>

Image Source: [Aadi Sustainability Solutions Pvt. Ltd.](#)

GATS (Global Alliance for Textile Sustainability Council)



GATS is an industry-led, not-for-profit Section 8 organisation dedicated to advancing sustainability, circularity, and innovation in the Indian textile sector, with a strong focus on supporting MSMEs. GATS empower small and medium enterprises to adopt sustainable practices, circular solutions, and cutting-edge technologies, enhancing their global competitiveness.



Mission

- Promote Recycled fibres as preferred raw materials
- Develop economically viable waste collection models
- Enable cost-neutral circularity
- Create Dignified Jobs



1. Resource Scarcity And Environmental Degradation

2. Waste Impact On Ecosystems And Biodiversity

3. Social And Economic Challenges

4. Product Development

GATS Impact

500	10,000	5BILLION	1,000+
TONS WASTE DIVERTED DAILY	TONS OF CO2 EMISSION AVOIDED DAILY	LITER WATER SAVED DAILY	JOBS CREATED WITH 40% HELD BY WOMEN

Click Here to Know More : <https://gats.org.in/>

Image Source: [GATS](https://gats.org.in/)

5.3 TIRUPUR

Location: Tamil Nadu, India's leading knitwear hub.

Accounts for over 55% of India's knitwear exports (~USD 8 billion annually).

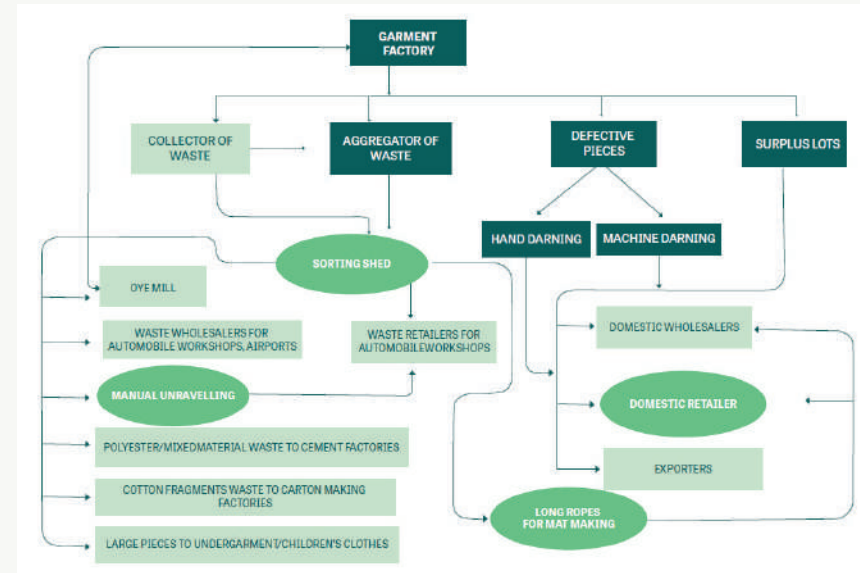
Dominant products: T-shirts, innerwear, casualwear.

Over 10,000 MSMEs engaged in spinning, knitting, dyeing, printing, garmenting.

Large labour migrant base from within Tamil Nadu and eastern states.

The cluster is a huge generator of cutting waste & rejected garments from export orders.

- MSMEs channeling cutting waste into recycled yarn & wipers.
- Piloting QR-coded traceability for EU buyers.
- Emerging circular businesses in upcycling rejected garments into new apparel.



IDH, Imperatives and Opportunities for Gendered Interventions in the Textile Waste Value Chain, (2025)

Waste Streams Handled

- **Pre-Consumer Waste** – waste from garment factories; rejects; waste from exporters.
- **Post-Consumer Waste (limited)** – small-scale initiatives in collection of used knitwear.
- **Processing Waste** – sludge from dyeing, effluents from washing, chemical residues.

5.4 CLUSTER BEST PRACTICES - TIRUPUR

Sags Apparels

Produces garments using 100% organic and fair-trade cotton, supporting farmer collectives.

Operates a net-zero certified facility covering carbon, water, and energy use. Implements rainwater harvesting, renewable energy, and waste minimisation measures across production.

- Living wages, fair labour policies across supply chain.
- On-site renewable energy use reducing dependency on fossil fuels.
- Closed-loop water management.
- Reduced emissions per garment through efficiency measures and green infrastructure.



Asia's 1st Garment Manufacturing Facility to Achieve Net-Zero in all forms



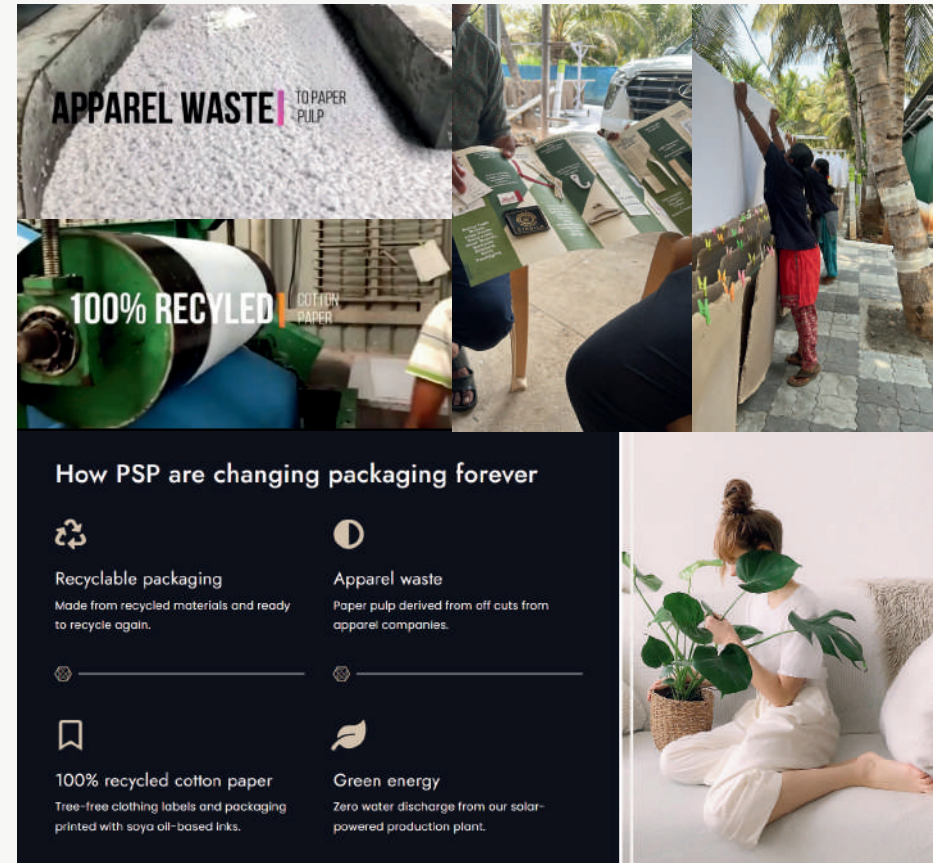
Click here to know more: <https://www.sagsapparels.com/>

Image Source: *Sag Apparels*

Recycling Cotton Waste into Sustainable Packaging

Punarbhavaa Sustainable Products Pvt. Ltd. works with the fashion and textile sector to recycle cotton waste into paper-based packaging solutions. Their process replaces virgin wood pulp with apparel offcuts, creating an alternative stream of recyclable labels, trims, and packaging. They :

- Convert cotton offcuts and post-production waste into handmade recycled paper.
- Supply recycled paper for fashion labels, tags, and trims.
- Pilot Digital Product Passport (DPP) documentation for packaging traceability.
- Adopt worker-friendly practices and compliance discussions on EPR and certification.
- Engage stakeholders in exploring post-consumer textile waste packaging solutions.



Click here to know more: <https://pspindia.net/>

Image Source: [Punarbhavaa](#)



Deutsche Gesellschaft für Internationale Zusammenarbeit
(GIZ) GmbH

A 2/18, Safdarjung Enclave, New Delhi - 110 029

T: +91 11 49495353, F: +91 11 49495391

W: www.giz.de/India