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India Accelerates Circular and Sustainable Textile Production to Strengthen Global Competitiveness and Resource Efficiency

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Recent Developments:

- The **Union Government** is promoting a **circular textile economy** through policy support for **organic fibres, green manufacturing, textile-waste recycling, eco-labelling, traceability, and market-based sustainability standards**.
- Recent initiatives aim to improve **resource efficiency**, reduce the environmental footprint of textile production, strengthen **Micro, Small and Medium Enterprises (MSMEs)**, and enhance India's competitiveness in global textile markets.

Current Status of India's Textile Sector:

Economic Importance:

- The **Textile and Apparel Sector** contributes around **2%** to India's **Gross Domestic Product (GDP)** and nearly **11%** to **Manufacturing Gross Value Added (GVA)**, making it one of the country's largest manufacturing industries.
- India is the **sixth-largest exporter** of textiles and apparel globally, accounting for nearly **4%** of global textile exports, while the sector provides direct employment to more than **45 million** people, including a large proportion of **women** and **rural workers**.
- The sector is a major contributor to **exports, employment generation, rural industrialisation**, and the **Make in India** initiative, thereby playing an important role in achieving **Viksit Bharat 2047**.

Need for Sustainable Transformation:

- Growing global emphasis on **Environmental, Social and Governance (ESG)** standards, **carbon neutrality**, and **responsible sourcing** is compelling India's textile industry to adopt sustainable production practices.
- International buyers increasingly prefer products with **low environmental footprints, traceable supply chains**, and **certified sustainable raw materials**, making sustainability an important determinant of export competitiveness.

Circular Textile Economy:

Meaning and Core Principles:

- A **Circular Textile Economy** aims to maximise the productive life of fibres, fabrics and garments through **reuse, repair, recycling, upcycling**, and **resource recovery**, thereby reducing dependence on virgin raw materials.
- The model promotes continuous circulation of textile resources within the production cycle instead of following the traditional **"take-make-dispose"** linear production pattern.

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- The approach complements the broader principles of the **Circular Economy**, **Resource Efficiency**, and **Extended Producer Responsibility (EPR)** by minimising waste generation and encouraging sustainable consumption.

Significance of Circularity:

- Circular production reduces **textile waste**, **greenhouse gas emissions**, **landfill pressure**, and the consumption of **water**, **energy**, and **hazardous chemicals** throughout the textile value chain.
- Adoption of circular manufacturing strengthens compliance with emerging global sustainability regulations, thereby improving India's export opportunities in premium international markets.
- The approach also supports **green employment**, encourages innovation in textile recycling technologies, and enhances long-term resource security.

Status of Circularity in India's Textile Sector:

Textile Waste Recovery and Recycling:

- India generates nearly **7.8 million tonnes** of textile waste annually, with the overwhelming share originating from **pre-consumer** and **post-consumer** domestic sources.
- More than **70%** of textile waste is recovered through **recycling**, **upcycling**, **downcycling**, or **reuse**, while nearly **95%** of pre-consumer textile waste is successfully reintegrated into production.
- The textile recovery ecosystem supports nearly **40–45 lakh** livelihoods, particularly benefiting **women**, **informal workers**, and **economically weaker communities** engaged in collection, sorting, repair, and recycling.

Successful Circularity Models:

- **Panipat**, Haryana, has emerged as one of India's largest textile recycling clusters and serves as an important example of large-scale circular textile manufacturing.
- Municipal textile recovery initiatives have demonstrated that scientific collection, segregation and recycling of discarded textiles can simultaneously reduce waste, create employment and strengthen local circular economies.

Sustainability at the Input Stage of the Textile Value Chain:

Sustainable Raw Materials:

- Sustainable production begins with environmentally responsible raw materials because fibre selection determines the overall ecological footprint of the textile value chain.
- Government policies encourage the cultivation and adoption of **organic fibres**, **natural fibres**, and **climate-resilient alternatives** to reduce environmental degradation.

Major Government Initiatives:

- **National Programme for Organic Production (NPOP)**: Promotes certification and marketing of organic products, including **organic cotton**, while its certification standards are recognised by the **European Union** and **Switzerland** for specified agricultural products.
- **Jute-Improved Cultivation and Advanced Retting Exercise (Jute-ICARE)**: Enhances **jute productivity**, improves fibre quality, and promotes sustainable cultivation through certified seeds, improved agronomic practices and scientific retting techniques.
- **Mission for Cotton Productivity**: Supports **climate-smart agriculture**, mechanisation and productivity enhancement while encouraging cultivation of **new-age natural fibres** such as **ramie**, **flax**, and **sisal** as sustainable alternatives to synthetic fibres.

- **National Fibre Scheme:** Promotes the availability of **natural**, **man-made**, and **emerging fibres**, reduces import dependence, strengthens domestic value chains, and encourages innovation in fibre production.

Reducing Hazardous Chemicals in the Textile Value Chain:

Regulatory and Policy Measures:

- India has prohibited the manufacture and use of several **hazardous azo dyes** and **benzidine-based dyes**, while implementing obligations under the **Stockholm Convention on Persistent Organic Pollutants (POPs)** to reduce the use of toxic chemicals in textile manufacturing.
- Adoption of safer chemicals improves **worker safety**, facilitates **textile recycling**, enhances **consumer confidence**, and strengthens compliance with international environmental standards.

Cleaner Chemical Management:

- Government-supported initiatives encourage industries to adopt **eco-friendly chemicals**, **clean production technologies**, and **responsible chemical management** throughout textile processing.
- Sustainable chemical management reduces pollution, improves product quality, and enables Indian textile exports to satisfy evolving global sustainability requirements.

Sustainability at the Production Stage:

Green Manufacturing:

- Textile manufacturing is highly resource-intensive because it consumes large quantities of **water**, **energy**, and **chemicals**, making cleaner production technologies essential for sustainable industrial growth.
- Policy interventions promote **resource efficiency**, **energy conservation**, **scientific waste management**, **wastewater treatment**, and **low-carbon manufacturing** across the textile value chain.

Prime Minister Mega Integrated Textile Region and Apparel (PM MITRA) Parks:

- **PM MITRA Parks** are being developed as integrated textile manufacturing hubs based on the **5F Vision—Farm to Fibre to Factory to Fashion to Foreign**.
- The parks provide integrated infrastructure including **Common Effluent Treatment Plants (CETPs)**, wastewater recycling facilities, common utilities, logistics support, and end-to-end textile manufacturing ecosystems.
- The integrated park model reduces production costs, improves economies of scale, strengthens exports, and promotes environmentally sustainable manufacturing.

Support for Micro, Small and Medium Enterprises (MSMEs):

- Since **MSMEs** account for the majority of India's textile production capacity, the Government promotes their transition towards sustainable manufacturing through dedicated financial and technological support.
- **Raising and Accelerating MSME Performance (RAMP)** facilitates technology adoption, capacity building, productivity improvement, and business competitiveness.
- **Micro and Small Enterprises—Green Investment and Financing for Transformation (MSE-GIFT)** promotes investment in clean technologies through financial assistance, while the **Micro and Small Enterprises—Scheme for Promotion and Investment in Circular Economy (MSE-SPICE)** encourages adoption of circular-economy practices.

Reducing Emissions and Promoting Circular Manufacturing:

Indian Carbon Market:

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- The textile sector has been brought under the compliance framework of the **Indian Carbon Market (ICM)** through the **Carbon Credit Trading Scheme (CCTS)** to encourage lower greenhouse gas emissions.
- Textile units achieving emission reductions beyond prescribed targets can earn **Carbon Credit Certificates**, creating financial incentives for adopting cleaner technologies and improving energy efficiency.

Cleaner Industrial Practices:

- Government initiatives promote **water conservation, energy efficiency, scientific chemical management**, and adoption of globally accepted **Best Available Techniques (BATs)** for sustainable textile manufacturing.
- Textile industries are required to install **Effluent Treatment Plants (ETPs)** or **Common Effluent Treatment Plants (CETPs)** to ensure wastewater discharge complies with prescribed environmental standards.

Research, Innovation and Green Materials:

- The **National Technical Textiles Mission (NTTM)** promotes research and innovation for converting **textile waste, biomass, and bio-residues** into advanced value-added materials such as technical textiles and high-performance fibres.
- Technological innovation strengthens India's capacity to develop sustainable products while improving industrial competitiveness and reducing environmental stress.

Promoting Sustainable Industry Ecosystems:

Responsible Manufacturing and ESG Adoption:

- Industry-led initiatives encourage voluntary adoption of **Environmental, Social and Governance (ESG)** principles, cleaner production systems, responsible sourcing, and internationally accepted sustainability standards.
- Knowledge-sharing platforms facilitate the exchange of best practices in **resource efficiency, waste minimisation, green technologies**, and **sustainable supply-chain management** across textile clusters.

Bharat Tex Platform:

- **Bharat Tex** serves as India's flagship global textile platform by bringing together the entire textile value chain, promoting **sustainable textiles, technical textiles, innovation, MSME participation, buyer-seller interactions**, and greater access to international markets.
- The platform also supports India's objective of becoming a global hub for **high-value, sustainable, and technology-driven** textile manufacturing.

Post-Production Circularity and Market Support:

Textile Waste Recovery and Resource Efficiency:

- Post-production sustainability focuses on **collection, segregation, repair, recycling, upcycling**, and **reintegration** of textile waste into the production cycle, thereby reducing landfill disposal and conserving natural resources.
- The **Solid Waste Management Rules, 2026** strengthen **waste segregation, circular economy principles**, and **Extended Producer Responsibility (EPR)**, while encouraging industries to utilise **Refuse Derived Fuel (RDF)** prepared from non-recyclable waste, including suitable textile residues.
- The **Mapping of Textile Waste Value Chain in India (2026)** provides a data-driven framework for improving textile-waste collection, recycling infrastructure, and resource recovery across the country.

Eco-Labelling, Traceability and Market Access:

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- The **Eco-Mark Scheme, 2024** provides environmental certification for textiles based on sustainability parameters such as efficient resource use, reduced emissions, responsible chemical management, and environmental performance.
- Initiatives such as **Kasturi Cotton** and **Silk Mark** strengthen **product traceability**, promote **responsible sourcing**, improve consumer confidence, and enhance the global identity of Indian textiles.
- Government initiatives promoting procurement of **upcycled textile products** encourage market creation, support circular businesses, and improve commercial viability of recycled textile products.

Challenges:

Environmental and Industrial Challenges:

- High consumption of **water**, **energy**, and **chemicals** during textile processing continues to impose significant environmental pressure.
- Limited adoption of advanced recycling technologies and inadequate segregation of post-consumer textile waste reduce the efficiency of circular manufacturing.

Economic and Institutional Challenges:

- Many **MSMEs** face financial constraints, limited technological capacity, and inadequate access to green finance, slowing their transition towards sustainable production.
- Compliance with evolving global **ESG**, **carbon**, and **traceability** standards requires substantial investment in technology, certification, and supply-chain modernisation.

Way Forward:

Strengthening Circular Manufacturing:

- Promote greater adoption of **resource-efficient technologies**, **renewable energy**, **water recycling**, and **low-carbon manufacturing** across the textile value chain.
- Expand investment in **textile recycling infrastructure**, scientific waste collection, and circular production models to maximise resource recovery.

Enhancing Competitiveness:

- Strengthen support for **MSMEs** through easier access to green finance, technology upgradation, digital traceability systems, and sustainability certification.
- Encourage wider adoption of **organic fibres**, **technical textiles**, **eco-friendly chemicals**, and internationally accepted quality standards to improve export competitiveness.
- Promote greater collaboration among **government**, **industry**, **research institutions**, and **start-ups** to accelerate innovation and develop a globally competitive sustainable textile ecosystem.

Value Addition for UPSC:

Important International Initiatives:

- **UN Sustainable Development Goal (SDG) 12** promotes **Responsible Consumption and Production**, making circular textiles an important component of sustainable industrial development.
- **UN Sustainable Development Goal (SDG) 13** supports climate action through lower emissions and resource-efficient manufacturing.
- The **Stockholm Convention on Persistent Organic Pollutants (POPs)** seeks to eliminate or restrict hazardous chemicals that persist in the environment and threaten human health.

- The **Global Organic Textile Standard (GOTS)** is one of the world's leading voluntary certification standards for environmentally and socially responsible textile production.

UPSC Enrichment:

- **Circular Economy** aims to minimise waste and maximise resource efficiency by keeping products and materials in continuous productive use through **reuse, repair, remanufacturing, and recycling**.
- **Extended Producer Responsibility (EPR)** places responsibility on producers for environmentally sound management of products throughout their life cycle, including post-consumer waste.
- The textile sector contributes directly to **GS Paper III** topics such as **Sustainable Development, Resource Efficiency, Environmental Conservation, Industrial Growth, MSMEs, Climate Change**, and the **Circular Economy**, while also providing valuable examples for **Essay** and **Interview** preparation.

Conclusion:

- India's textile sector possesses a strong foundation for sustainable growth due to its traditional emphasis on **resource conservation, reuse, and natural fibres**.

Continued policy support for **organic production, green manufacturing, circular economy practices, waste recovery, traceability, and clean technologies** can strengthen export competitiveness, generate green employment, improve resource security, and position India as a global leader in sustainable textile manufacturing