Tex-RAMPS: Re-Engineering India's Textile Science Ecosystem

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Abstract

India's textile and apparel sector is undergoing a structural transformation driven by the convergence of science, technology, sustainability, and data-centric governance. Traditionally rooted in fibre production and manufacturing strength, the sector now faces increasing global competition, environmental pressures, and the demand for innovation-led growth. In this context, the Government of India's *Textiles Research, Assessment, Monitoring, Planning and Start-ups (Tex-RAMPS)* scheme represents a strategic intervention aimed at strengthening the research and innovation backbone of the textile ecosystem. This article critically examines Tex-RAMPS as a science-enabling policy framework, highlighting its role in advanced textile research, data-driven planning, institutional capacity building, and start-up support. The discussion situates Tex-RAMPS within national and global trends in textile science and outlines its potential to reposition India as a knowledge-driven textile economy.

1. Introduction

The Indian textile and apparel industry occupies a unique position in the national economy, contributing significantly to employment, exports, and rural livelihoods. Despite this scale, the sector has historically been characterised by fragmented research efforts, limited integration between academia and industry, and insufficient use of data for strategic planning (Gupta, 2021). As global textile production shifts toward high-performance materials, smart textiles, and

sustainable manufacturing systems, India's long-term competitiveness increasingly depends on the strength of its scientific and innovation ecosystem.

Recognising this need, the Government of India approved the *Tex-RAMPS* scheme with a financial outlay of ₹305 crore for the period 2025–26 to 2030–31 (Press Information Bureau [PIB], 2024). Unlike production-linked or infrastructure-focused initiatives, Tex-RAMPS is explicitly designed to strengthen the *intellectual and analytical foundations* of the textile sector, marking a shift from volume-driven growth to knowledge-driven transformation.

2. Conceptual Framework of Tex-RAMPS

Tex-RAMPS is structured as a Central Sector Scheme implemented by the Ministry of Textiles, with the objective of improving research quality, innovation outcomes, and policy effectiveness across the textile and apparel value chain (Ministry of Textiles, 2024). The scheme integrates five interrelated pillars: research, assessment, monitoring, planning, and start-up support.

At its core, Tex-RAMPS acknowledge that modern textile competitiveness is shaped not only by production efficiency but also by scientific capability, real-time data availability, and institutional collaboration. This approach aligns with international best practices in industrial innovation policy, where data systems and research networks play a central role in sectoral advancement (OECD, 2022).
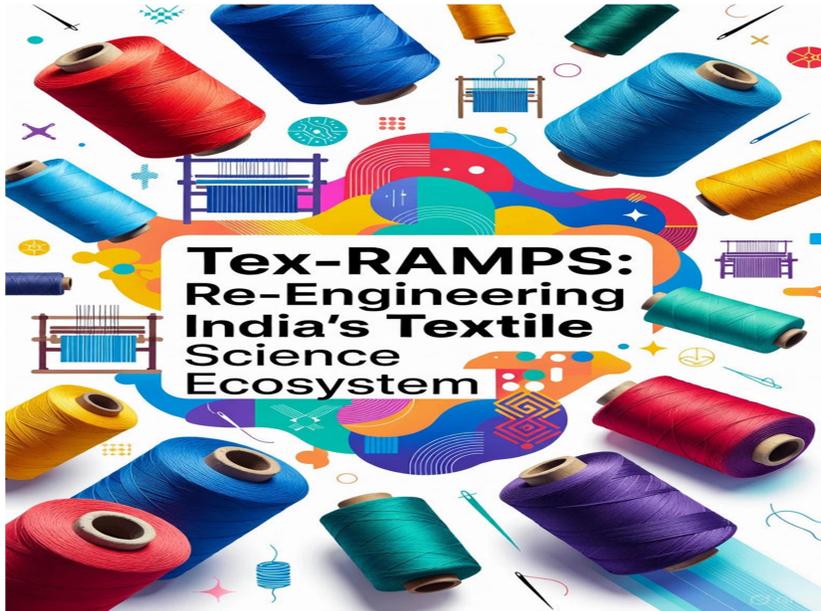
3. Strengthening Textile Science and Research Capacity

3.1 Advanced Materials and Smart Textiles

A major scientific thrust under Tex-RAMPS is the promotion of research in advanced textile materials, including smart, functional, and technical textiles. These materials integrate properties such as sensing, conductivity, adaptability, and enhanced protection, expanding textile applications beyond apparel into healthcare, defence, construction, and sports (Nayak & Padhye, 2019).

Research areas encouraged under the scheme include high-performance fibres, functional finishes, wearable textile systems, and polymer-based composites. Such directions reflect global research trends where textiles are increasingly viewed as engineered systems rather than passive materials (Textile Research Journal Editorial Board, 2023). By supporting structured research programmes and collaborative projects, Tex-RAMPS aims to bridge the gap between laboratory-scale innovation and industrial application.

3.2 Sustainability-Oriented Textile Science

Environmental sustainability forms a cross-cutting theme within Tex-RAMPS-supported research. Scientific efforts are expected to focus on bio-based fibres, low-impact dyeing technologies, water-efficient processing, and circular material systems (Kumar et al., 2022). These priorities resonate with international sustainability frameworks and reflect growing regulatory and consumer pressures for responsible textile production (European Commission, 2022).

Importantly, Tex-RAMPS enables sustainability research to move beyond isolated pilot studies toward system-level assessments, including life-cycle analysis and resource-efficiency modelling, which are essential for evidence-based environmental decision-making (Allwood et al., 2006).

4. Data-Driven Planning and Monitoring: A Structural Shift

One of the most distinctive features of Tex-RAMPS is the establishment of an *Integrated Textiles Statistical System (ITSS)*. This digital platform is intended to consolidate data related to production, employment, trade, technology adoption, and innovation performance across the textile sector (Ministry of Textiles, 2024).

From a scientific and policy perspective, ITSS represents a critical shift from fragmented, retrospective data collection toward continuous, real-time analytics. Such systems enable researchers and policymakers to identify emerging trends, assess the impact of interventions, and design targeted research and innovation programmes (Babu & Subramaniam, 2018). In the long term, the availability of reliable sectoral data can significantly enhance the quality of textile research, forecasting, and policy evaluation in India.

5. Academia–Industry Collaboration and Capacity Building

The effectiveness of textile science depends heavily on collaboration between academic institutions, research laboratories, and industry stakeholders. Tex-RAMPS explicitly addresses

this dimension through capacity-building initiatives, knowledge-exchange platforms, and stakeholder consultations (Ministry of Textiles, 2024).

By facilitating workshops, training programmes, and collaborative research projects, the scheme encourages interdisciplinary approaches that integrate textile engineering, material science, data analytics, and environmental science. Such collaboration is essential for translating scientific discoveries into scalable industrial solutions (Chandrasekhar & Rao, 2020). For universities and research institutions, Tex-RAMPS creates opportunities to align academic research agendas with national industrial priorities.

6. Start-Ups, Innovation, and Research Translation

Tex-RAMPS places significant emphasis on nurturing start-ups and innovation-driven enterprises in the textile domain. Through incubation support, innovation challenges, and structured mentoring, the scheme seeks to accelerate the commercialisation of research outcomes (PIB, 2024).

This focus reflects a broader transformation in manufacturing sectors, where start-ups play a critical role in introducing disruptive technologies, digital platforms, and niche material innovations (World Economic Forum, 2022). In textiles, such ventures are increasingly active in areas such as smart fabrics, recycling technologies, digital design systems, and sustainable materials, reinforcing the relevance of Tex-RAMPS as a research-to-market bridge.

7. Implications for India's Textile Ecosystem

From a scientific standpoint, Tex-RAMPS has the potential to reshape India's textile ecosystem in several ways. First, it strengthens the institutional foundations for high-quality textile research by integrating funding, data, and collaboration mechanisms. Second, it supports a transition toward advanced and sustainable textile technologies, enhancing India's competitiveness in global value chains (IBEF, 2024). Third, by embedding data analytics into sectoral governance, it improves transparency, accountability, and strategic foresight.

These outcomes align closely with national objectives such as the National Technical Textiles Mission and India's broader innovation-led manufacturing strategy (Government of India, 2020; NITI Aayog, 2022).

8. Conclusion

Tex-RAMPS represents a decisive step in re-engineering India's textile science ecosystem. By placing research, data, and innovation at the centre of sectoral development, the scheme moves beyond conventional policy approaches focused solely on production expansion. Its success, however, will depend on effective implementation, sustained collaboration among stakeholders, and the ability of research institutions and industry to fully leverage the opportunities it creates.

As India seeks to position itself as a global leader in advanced, sustainable, and intelligent textiles, Tex-RAMPS offers a timely and scientifically grounded framework for transforming policy intent into long-term innovation capacity.

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