Designing Transcontinental Textile Production Systems: The T7 Model as a Scientific Entry Strategy for the European Market

Cedric Heyen
Institut für Textiltechnik of RWTH Aachen University, Germany

Dr. Robert Boich
Institut für Textiltechnik of RWTH Aachen University, Germany

Prof. Dr. Thomas Gries
Institut für Textiltechnik of RWTH Aachen University, Germany

Abstract

This research introduces Textile Factory 7.0 (T7), a conceptual framework designed to explore how Asian textile companies can strategically enter the European market by leveraging sustainable, digital, and customizable manufacturing paradigms. The study aims to develop a research-based system architecture that aligns cutting-edge technological innovation with the evolving ecological and consumer demands of the European textile industry.

The methodology follows a systems design approach, combining theoretical modeling with empirical research. The core of the conceptual model is built around four interrelated research modules: (1) On-Demand Manufacturing, (2) Microfactory Engineering, (3) Biosphere, and (4) Digital Textiles. These modules are framed by three overarching megatrends—Zero Emission, Artificial Intelligence and Robotics, and Biotechnology—extending the logic of Industry 4.0 into a future-oriented textile production strategy.

To validate the relevance of the proposed model, a targeted survey was conducted at the ITMF Conference 2024, focusing on digital and novel business models in textile technology. Results indicate a strong international interest—especially among decision-makers from Asia, Europe, and the Middle East—in developing decentralized production networks and platform-based manufacturing systems.

Key findings suggest that the T7 framework offers a scientifically grounded roadmap for non-European manufacturers aiming to build compliant, scalable, and consumer-centric textile production for the EU market. The study contributes to the ongoing discourse on sustainable globalization by outlining how research-driven innovation can function as a strategic enabler for transcontinental textile ecosystems.

Keywords

International Markets, Microfactory Engineering, Industry 5.0, Industry 4.0.