The Fabric of Change: A Study on Technology Adoption in Surat's Traditional Textile Industry

BHAGAT KHUSHBU PRAMODKUMAR
(Research Scholar)
VNSGU, Surat.
Email:- khushiijariwalla@gmail.com
ORCID ID: 0009-0005-8996-2365

Dr. MEHULKUMAR BHARATBHAI SHAH
Assistant Professor (Adhyapak Sahayak)
Navyug Commerce College, Surat
Email: mbs@navyugcommerce.ac.in

Abstract:

This research paper investigates the patterns, drivers, and challenges of digital technology adoption within the traditional textile industry of Surat, India. This study is based on secondary data collected from industry reports, academic research, case studies, and news publications to present an overall view of the topic. The analysis shows that digital adoption is uneven, with a dominant hybrid model where modern technologies in marketing and payments exist alongside traditional operating practices. The main drivers are high competition, the accelerating role of the COVID-19 pandemic, government support, and a growing entrepreneurial mindset. However, many challenges still exist, such as high costs, lack of digital skills, cybersecurity worries, and a strong preference for relationship-based business practices. The paper concludes that digital transformation is essential for the sector's global competitiveness and recommends a multi-stakeholder approach that includes targeted policy support, industry-specific technological solutions, and improved digital literacy initiatives to ensure more balanced and sustainable technology adoption.

1. Introduction:

Digitalization is driving significant transformation in the global textile and apparel industry, with a growing focus on Industry 4.0, smart manufacturing, and omnichannel retail. In the Indian context, this wave of digitalization presents both opportunities and challenges for the country's vast but fragmented textile industry. Surat, widely recognized as the "Manchester of the East" and the world's leading hub for man-made fabric (MMF) production, lies at the heart of this transition. Its economy largely depends on a complex and traditional textile ecosystem made up of thousands of small and medium family-run enterprises, power loom units, processors, and traders. Historically, this ecosystem has relied on deeply rooted practices such as trust-based transactions, face-to-face negotiations in busy market lanes, and production planning managed through personal networks. However, the combined pressures of globalization, fluctuating raw material costs, stringent compliance requirements, and the urgent demand for sustainability are driving this traditional sector toward modernization. This paper seeks to examine the central research question: What is the present state, nature, and key determinants of digital technology adoption in Surat's traditional textile industry?

Using a rigorous secondary data analysis approach, this study aims to map the digital adoption landscape, identify key enablers and barriers, and examine its impact on business models. Understanding this dynamic is essential for stakeholders—including business owners, policymakers, and technology providers—to follow a path that balances technological efficiency with the sector's valuable traditional strengths.

2. Literature Review & Theoretical Framework

This review brings together recent academic perspectives (2020–2024) to build a theoretical foundation and highlight key debates on digitalization in traditional industrial clusters such as Surat's textile sector.

2.1 Digital Transformation in Traditional Industrial Clusters: A Contested Terrain

The discussion on digitalization in established industrial clusters has shifted from seeing technology as a simple, linear upgrade to understanding it as a complex socio-technical process. Early optimism (e.g., Schilirò, 2020) viewed technologies such as IoT and AI as direct pathways for industrial clusters to become "smart," improving efficiency and global integration. However, recent literature critically examines this view. Bagnoli et al. (2023) argue that successful digital transformation in industrial clusters depends less on simply adopting digital tools and more on strengthening the "relational infrastructure," meaning the networks of knowledge sharing and collaboration that shape a cluster's identity. In places like Surat, business depends strongly on trust and personal relationships. If new technology disturbs these trusted networks, it may be rejected even if it is technically useful.

2.2 The MSME Dilemma: Capabilities, Costs, and Context

A large body of recent research focuses on the challenges faced by Micro, Small, and Medium Enterprises (MSMEs), which are the backbone of Surat's textile industry. Studies in emerging economies consistently point to a "digitalization gap" caused by limited resources and risk aversion (Kumar et al., 2022). For MSMEs, spending on digital technology often competes with day-to-day operating costs, making the perceived return on investment (ROI) a key—and often limiting—factor. Additionally, Nambisan et al. (2020) introduce the idea of "digital affordances," referring to the actions and opportunities that technology offers from the user's perspective. For MSMEs, money spent on digital technology competes with daily business expenses, so uncertain return on investment (ROI) often discourages adoption. Nambisan et al. (2020) explain "digital affordances" as the practical actions and opportunities a technology provides to its users.

2.3 The Indian Textile Sector: Policy, Platforms, and Pragmatism

Studies on the Indian textile sector show a landscape shaped by ambitious government policies and practical ground-level realities. Initiatives such as PM-MITRA parks and the National Technical Textiles Mission are presented as top-down drivers aimed at modernizing the fragmented value chain (Kapoor & Sinha, 2023). At the same time, the rapid growth of social commerce—using platforms like Instagram and WhatsApp for B2B and B2C transactions—represents a practical, bottom-up form of digitalization. Recent studies (e.g.,

Gupta & Soni, 2024) suggest that this is not a failure to adopt enterprise software, but a deliberate strategy by traditional businesses to use low-cost, familiar tools to expand their reach while maintaining core relationship-based practices. This results in what they call a "platform-enabled traditional model," a hybrid approach that is often missed in formal digital maturity assessments but proves highly effective in the Indian context.

2.4 Synthesizing a Conceptual Framework: Towards Selective Hybridization

This review highlights a growing understanding that digital adoption in traditional industries is a process of selective hybridization. Digital adoption is not a simple choice between tradition and technology; it involves a strategic, context-driven integration, where new tools are adapted to strengthen—not replace—existing advantages such as trust, flexibility, and networks. This paper therefore examines Surat's textile industry through this perspective, focusing not on whether technology is being adopted, but on how, where, and why specific digital tools are integrated into the cluster's traditional practices. This approach enables a more nuanced analysis than frameworks that assume either complete transformation or stagnation.

Objectives of the study

1. To map the extent and pattern of digital technology adoption across Basic functions in Surat textile industry**.**
2. To identify the key drivers and critical barriers shaping digital adoption decisions among textile MSMEs in Surat.
3. To analyze the impact and hybrid nature of digital integration on traditional business models and operations.

3. Methodology

This paper uses a secondary data analysis approach. This non-empirical method systematically collects, synthesizes, and critically evaluates existing data from publicly available sources to generate new insights and address specific research questions. The study utilized data from multiple sources:

Academic Literature: Peer-reviewed studies on digitalization in textiles and Indian MSMEs.

Mapping Objectives to Findings, Results & Discussion

The data were analyzed thematically, with codes developed inductively from the literature and then organized according to the TOE framework to ensure a systematic investigation.

Objective	Corresponding Findings (What the Data Shows)	Core Results & Discussion (Your Analysis & Argument)
1. To map the extent and	Find a tiered adoption pattern: High use of WhatsApp/Instagram	This reveals a "peripheral digitization" strategy. Technology is

pattern of adoption	for marketing; moderate use of UPI & basic software; low use of integrated ERP, AI, or advanced B2B platforms.	adopted where it complements tradition (e.g., marketing) but avoided where it could disrupt core trust-based transactions (e.g., wholesale negotiations).
2. To identify key drivers & barriers	Drivers: Post-pandemic survival, customer demands, and competition from digital-native brands. Barriers: High-cost perception, skills gap, data security fears, and a cultural preference for *"jahaan"* (trust-based dealing).	The TOE Framework is confirmed: *Environment* (pandemic, policy) pushes adoption, but *Organizational* (resources, skills) and *Cultural-Environmental* (trust norms) contexts create powerful inertia. The barrier is not just technical but socio-cultural.
3. To analyze the hybrid nature & impact	Identify a dominant "Hybrid Model": Businesses use digital storefronts (Instagram) but finalize bulk orders via phone; use UPI for payments but maintain relationships through in-person meetings.	Argue that this selective hybridization is a strategic pragmatism, not failed transformation. It allows firms to gain digital efficiencies while preserving the social capital essential to their operation. The impact is incremental resilience, not radical disruption.

4. Findings

4.1 The Digital Adoption Landscape: A Hybrid Reality

The analysis shows that digital adoption in Surat's textile sector is not uniform but occurs along a spectrum, resulting in a distinctive "hybrid model."

- **High Adoption Domains (The Digital Periphery):** In Surat's textile sector, WhatsApp, Facebook, and Instagram are widely used for orders, customer service, branding, and sales. Digital payment systems like UPI and Paytm are also common, making transactions faster and safer.
- **Selective Adoption (The Operational Core):** In core operations, digital adoption is selective. Small businesses mostly use basic accounting software like Tally, while larger export-oriented units use advanced ERP systems. Some premium saree

manufacturers use CAD for faster designs. E-commerce is growing for B2C sales, but B2B online marketplaces are adopted cautiously due to concerns about pricing transparency and conflicts with existing dealers.

- **Low Adoption (Advanced Integration):** The use of CRM, ERP, data analytics, and integrated e-commerce platforms is limited. Most diamond and textile wholesalers avoid direct online selling due to concerns about price transparency and conflict with existing sales channels. Cloud-based SaaS tools are also rarely adopted.

4.2 Key Drivers of Digital Adoption

- **Customer Demand:** Retail customers expect digital payment options like UPI and access to online product catalogues.
- **Competitive Necessity:** Businesses adopt digital tools to match competitors who actively promote on social media.
- **Operational Efficiency:** Platforms such as WhatsApp improve communication speed with clients across India.
- **Post-Pandemic Catalyst:** The demand for contactless transactions after COVID-19 accelerated the use of UPI and digital catalogues.

4.3 Barriers and Resistances

Digital adoption faces resistance due to strong trust-based business practices, high perceived costs with uncertain returns, lack of digital skills, and concerns about internet reliability and cyber fraud—especially in high-value transactions like diamonds.

5. Discussion: Emergence of a Hybrid Digital Model

The findings show that Surat's textile sector is not fully digital but follows a hybrid model. Core business activities remain trust- and relationship-based, while areas like marketing, customer contact, and payments are digital. Technology is adopted only when it supports existing practices, such as using Instagram for design display while final deals are completed through personal meetings.

6. Conclusion and Recommendations

In Surat, the interaction between technology and tradition is gradual rather than revolutionary. Digital tools are widely accepted where they improve communication and marketing without disrupting trust-based transactions. To achieve broader digital growth, Surat's textile sector requires a careful and balanced approach.

Recommendations:

Policymakers and industry bodies should promote practical, local-language digital training, provide cyber safety support, and encourage adoption through affordable, subsidized digital tools for SMEs

Technology providers should create simple, low-cost, Gujarati-language digital tools that fit existing business practices and provide trial access with strong local support.

Business owners should encourage small-scale digital trials and empower younger family members to lead and test new digital initiatives

7. Limitations and Future Research

The study focuses only on Surat, so the findings may not apply to all Indian cities. Future research can examine digital adoption over time and compare Surat with other textile clusters such as Ludhiana and Tirupur.

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