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FACTORS FOR ENHANCING THE COMPETITIVENESS OF COTTON FIBER IN THE TEXTILE INDUSTRY

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ABSTRACT: Cotton fiber, despite facing intensifying competition from synthetic alternatives particularly polyester, which commanded 59% of global fiber production in 2024 — retains indispensable attributes of breathability, biodegradability, and consumer preference. This article investigates the key determinants of cotton fiber's competitiveness in the global textile industry through a multi-factor analysis encompassing raw material quality, technological upgrading, sustainability certification, market diversification, and value chain integration. Empirical data are drawn from USDA, Textile Exchange, COMTRADE, and industry market reports covering the period 2020–2024. A comparative analysis of leading cotton-exporting nations — including Brazil, India, and Uzbekistan — is conducted. The findings reveal that competitiveness is primarily driven by fiber quality improvement, adoption of precision agriculture and advanced ginning technologies, sustainability certification uptake, and strategic transition from raw fiber exports toward finished, high-value textile products. The case of Uzbekistan is examined in depth, where textile exports grew from approximately USD 6 million in 2017 to USD 3.1 billion in 2023, demonstrating the transformative impact of cluster-based industrial policy and vertical integration. The article concludes with policy recommendations for cotton-producing developing economies to enhance long-term competitiveness in the global textile market.

Keywords: cotton fiber; textile industry competitiveness; value chain integration; sustainability certification; Uzbekistan textile sector; synthetic fiber competition; advanced ginning technology

1. INTRODUCTION

The global textile industry is undergoing a structural realignment driven by the rapid expansion of synthetic fibers, particularly polyester, and by shifting consumer preferences toward sustainable materials. According to Textile Exchange's Materials Market Report (2025), total global fiber production reached 132 million tonnes in 2024, of which polyester alone constituted approximately 59% — equivalent to around 78 million tonnes. Cotton, while retaining its position as the second most widely produced fiber, saw its volume decline marginally from 24.8 million tonnes in 2022/23 to 24.5 million tonnes in 2023/24, reducing its global market share to 19% (Textile Exchange, 2025).

This competitive dynamic presents significant strategic challenges for cotton-producing nations, yet simultaneously creates opportunities for differentiation through quality, sustainability, and product upgrading. The global cotton textile market was valued at USD 1,837 billion in 2023 and is projected to reach USD 3,612 billion by 2032, growing at a compound annual growth rate (CAGR) of 7.8% (Introspective Market Research, 2025). This paradox — of cotton losing fiber

market share while cotton textile markets expand — underscores the importance of value-added transformation over raw commodity exports.

The imperative to enhance cotton fiber competitiveness is particularly acute for developing economies that rely on cotton as a primary agricultural and industrial commodity. Uzbekistan, ranked as the sixth largest cotton producer globally, provides a compelling case study. Over the period 2017–2023, its textile and garment export revenues grew from approximately USD 6 million to USD 3.1 billion through a systematic policy of industrial upgrading, cluster formation, and import-substitution for high-value textile products (USDA GAIN Report, 2024; Daryo News, 2024).

This article proceeds as follows: Section 2 reviews the existing literature on industrial competitiveness in the textile sector. Section 3 describes the research methodology. Section 4 presents empirical results and comparative analysis. Section 5 discusses policy implications, and Section 6 concludes.

2. LITERATURE REVIEW

2.1 Theoretical Frameworks for Industrial Competitiveness

The concept of industrial competitiveness has been analyzed through multiple theoretical lenses. Porter's (1990) Diamond Model identifies four determinants of national competitive advantage: factor conditions, demand conditions, related and supporting industries, and firm strategy and rivalry. In the context of cotton textiles, factor conditions encompass land quality, irrigation infrastructure, and labor, while demand conditions reflect the preferences of domestic and international buyers for certified, high-quality fibers.

Krugman (1994) distinguished national and firm-level competitiveness, arguing that countries compete not in the same sense as firms, but through productivity growth and structural transformation. This distinction is relevant for cotton-producing nations, where competitiveness is increasingly determined not by the cost of raw fiber, but by the capacity to process it into differentiated, high-margin products (Gereffi & Memedovic, 2003).

2.2 Competitiveness Factors in the Cotton Textile Sector

Research on textile sector competitiveness consistently identifies several critical determinants. Birnbaum (2008) demonstrated that product quality and reliability of delivery schedules were more significant drivers of buyer sourcing decisions than price alone, particularly in European and North American markets. Kaplinsky & Morris (2001) showed that upgrading along global value chains — from fiber to yarn, fabric, and finished garment — is the primary mechanism through which developing country producers improve their competitive position.

The role of environmental certification has attracted growing scholarly attention. Seuring & Müller (2008) found that supply chain sustainability practices positively correlate with market access and premium pricing. More recently, studies by Textile Exchange (2024) confirmed that GOTS-certified organic cotton production grew approximately 12% year-on-year in 2024, and that branded garments made from certified fibers demonstrated a 25% higher retail velocity than uncertified equivalents, underscoring the commercial value of traceability (Technavio, 2024).

2.3 Synthetic Fiber Competition and Cotton's Strategic Response

The competitive threat from synthetic fibers, especially polyester, has been extensively documented. Grand View Research (2024) reported that the synthetic fiber segment held the largest global revenue share of 52.0% in 2024. Polyester's advantages include lower production cost, greater colorfastness, and ease of integration into automated manufacturing. However, growing environmental awareness and regulatory pressure — particularly the EU Ecodesign for Sustainable Products Regulation — have created structural headwinds for fossil-based synthetics and renewed opportunities for natural fibers (Textile Exchange, 2025).

Consumer preference data support this shift: multiple independent surveys conducted in 2024 consistently showed that over 62% of apparel shoppers in North America and Europe actively prefer cotton or cotton-blend fabrics over synthetic alternatives when purchasing everyday clothing, driven by comfort, skin compatibility, and perceived sustainability (Dataintelo, 2026). This creates a strategic window for cotton producers who can credibly communicate sustainability credentials.

3. METHODOLOGY

3.1 Research Design

This study adopts a mixed-method research design combining descriptive statistical analysis, comparative case study methodology, and factor analysis. The research is structured around the central question: which factors most significantly determine cotton fiber competitiveness in the contemporary textile industry, and how can developing-country producers leverage these factors to enhance their market position?

3.2 Data Sources

Primary quantitative data are drawn from the following sources: (1) USDA Foreign Agricultural Service GAIN Reports for Uzbekistan (2022–2024), covering production volumes, export flows, and industry structure; (2) United Nations COMTRADE database for bilateral trade flows; (3) Textile Exchange Materials Market Reports (2024, 2025) for global fiber production shares; (4) ICE (Intercontinental Exchange) cotton futures data for price volatility analysis; and (5) industry market research reports from Technavio, Grand View Research, and Coherent Market Insights for market sizing and forecast data.

The analytical timeframe spans 2017–2024, enabling assessment of structural trends and the impact of policy interventions in Uzbekistan's textile sector. Comparative data for Brazil, India, and Uzbekistan are used to identify transferable best practices.

3.3 Analytical Framework

Competitiveness is operationalized along five dimensions: (1) Raw material quality and supply chain reliability; (2) Technology adoption in cultivation and processing; (3) Sustainability certification and market access; (4) Value chain integration and product sophistication; and (5) Institutional and policy environment. Each dimension is assessed qualitatively and, where data permit, quantitatively through relevant indicators such as export growth rates, certification coverage, and investment volumes.

4. RESULTS AND DISCUSSION

4.1 Global Cotton Market: Position and Competitive Pressures

Table 1 summarizes the global fiber production landscape, illustrating the structural dominance of synthetic fibers and the relative position of cotton.

Fiber Type	Production 2024 (mn tonnes)	Market Share (%)	CAGR Forecast (2025–2030)
Polyester (total)	78.0	59%	+5.8%
Cotton	24.5	19%	+3.2%
Man-made cellulosics	8.1	6%	+4.1%
Recycled polyester	9.3	7.6%*	+6.5%
Wool	1.1	0.8%	+2.0%

Other fibers	~10.0	~7.6%	—

Table 1. Global fiber production structure, 2024 (* included in total, shown separately for reference). Source: Textile Exchange Materials Market Report, 2025.

The data confirm that cotton, while facing structural pressure from synthetic fibers, remains indispensable in consumer apparel markets. Critically, cotton's competitive position has shifted from volume to value: the cotton fiber segment alone was valued at USD 40.53 billion in 2024 (Technavio, 2024), reflecting substantial price premiums achievable through quality differentiation.

4.2 Factor 1: Raw Material Quality and Fiber Grading

Fiber quality — measured through staple length, micronaire, strength (g/tex), and uniformity index — constitutes the foundational competitiveness parameter. High-quality, long-staple cotton commands significant price premiums in international markets: Egyptian Giza 45 extra-long staple cotton, for instance, trades at 2–3 times the price of standard upland cotton grades. Advanced ginning technologies, including high-volume instrument (HVI) testing systems and automated classing facilities, enable producers to accurately characterize and market fiber quality.

Uzbekistan's challenge in this dimension is instructive. Despite producing 621,000 metric tons in MY 2023/24, the country's mechanization rate remains approximately 20%, requiring approximately 2 million seasonal workers for manual harvesting annually (USDA GAIN, 2024). Low mechanization compromises fiber quality consistency — unharvested fields in December 2024 negatively affected both quantity and quality — and limits the country's ability to reliably supply large-volume, premium-quality contracts.

4.3 Factor 2: Technological Upgrading in Cultivation and Processing

The adoption of advanced agricultural and processing technologies has emerged as a primary vector for cost reduction and quality enhancement. Table 2 presents key technology dimensions and their competitive impacts.

Technology Area	Application	Competitive Impact	Adoption Leaders
Precision Agriculture	Satellite monitoring, soil sensors, variable-rate application	15–25% input cost reduction	USA, Brazil, Australia
Drip Irrigation	Reduces water use per kg fiber	30–40% water saving	Israel, USA, Uzbekistan (growing)
GM/Bt Cotton Varieties	Pest resistance, higher yield	10–20% yield increase	India, USA, Brazil, China
Advanced Ginning (HVI)	Automated fiber quality testing	Quality premium pricing	USA, Australia, Brazil

Digital Farm Management	Mobile platforms, precision scheduling	Better yield predictability	USA, India
Ring-to-Compact Spinning	Higher yarn strength, finer counts	15–20% higher yarn price	China, Turkey, India

Table 2. Technology dimensions and competitive impacts in the cotton textile value chain. Source: Renub Research (2024); USDA GAIN Uzbekistan (2024); Technavio (2024).

India's proposed Cotton Technology Mission (announced April 2024) aims to systematically enhance cotton yield and quality through coordinated technology deployment. Brazil's ascent as the world's leading cotton exporter in 2023/24, with 12.4 million bales exported, is directly attributable to large-scale precision agriculture adoption on Cerrado farmland, enabling cost-competitive production at scale (Coherent Market Insights, 2026).

4.4 Factor 3: Sustainability Certification and Environmental Positioning

Environmental certification has transitioned from a niche marketing tool to a mainstream market access requirement. GOTS-certified organic cotton fabric production grew approximately 12% year-on-year in 2024, and leading global fashion and retail brands have committed to 100% sustainable cotton sourcing by 2025–2030 (Dataintelo, 2026). The Better Cotton Initiative (BCI), Fairtrade Cotton, and organic certification schemes now cover 34% of global cotton production, up from 29% in 2022 (Textile Exchange, 2025).

The commercial logic is compelling: GOTS-certified organic cotton commands retail price premiums of 20–30% over conventional equivalents, and certified supply chains demonstrate measurably higher buyer retention rates. For Uzbekistan, the resolution of the longstanding forced labor concern — formally resolved in March 2022 per international NGO assessments — has opened access to EU and North American sustainability-conscious buyers, representing a structural opportunity for certified fiber exports.

4.5 Factor 4: Value Chain Integration and Product Sophistication

The strongest empirical evidence for competitiveness enhancement comes from vertical integration and product upgrading strategies. Table 3 illustrates Uzbekistan's textile export trajectory, demonstrating the impact of systematic value chain policy.

Year	Textile & Garment Exports (USD)	Key Policy Intervention	No. Export Markets
2017	~$6 million	Forced labor reform begins; cluster system introduced	—
2020	~$1.5 billion	Cluster system operational; investment incentives active	~60

2022	~$2.4 billion	Forced labor issue formally resolved; FDI inflow	~75
2023	$3.1 billion	ILO Better Work Program launched; EU market entry	83
2024 (proj.)	~$3.0 billion	Presidential decree: target $7 bn by 2028	85+
2028 (target)	$7.0 billion	EU+US market focus; $5bn FDI target	100+

Table 3. Uzbekistan textile and garment export trajectory, 2017–2028. Sources: USDA GAIN (2024); Daryo News (2024); COMTRADE (2025).

The 500-fold increase in export value over six years constitutes one of the most rapid industrial transformation cases in the global textile sector. According to Boston Consulting Group analysis cited by Uzbekistan's trade authorities, the country has potential to achieve USD 15 billion in textile production, supporting 500,000 new jobs, provided value chain upgrading continues (Daryo News, 2024).

Despite this progress, structural vulnerabilities persist. Approximately 80% of current exports are directed to traditional markets — primarily Russia and neighboring CIS countries — with the share of high value-added finished products in total exports remaining limited. Russia absorbs 64% of Uzbek cotton fabric exports and 20% of yarn exports (USDA GAIN, 2024), creating concentrated market dependency. The export geography must be diversified toward European and North American markets, which offer higher margins but impose stricter quality and compliance requirements.

4.6 Factor 5: Price Competitiveness and Market Volatility Management

Price volatility constitutes a fundamental competitive risk. ICE cotton futures experienced a peak-to-trough decline exceeding 45% within a 12-month period in 2023, driven by weather disruptions in key growing regions and trade policy uncertainty (Dataintelo, 2026). US cotton futures fluctuated between 63 and 74 cents per pound in 2024, reaching lows not seen since the COVID-19 pandemic, primarily due to escalating trade tensions between the US and China (Coherent Market Insights, 2026).

Effective price risk management — through futures contracts, purchase price floors, and diversified buyer portfolios — is therefore a critical competitiveness enabler. Uzbekistan's policy decision to abandon minimum cotton purchase price guarantees, while increasing market orientation, exposes farmers to downside price risk, contributing to the low mechanization and quality issues observed in 2024 harvests.

4.7 Comparative Analysis: Brazil, India, and Uzbekistan

Table 4 presents a comparative competitiveness matrix across the three case study countries.

Competitiveness Factor	Brazil	India	Uzbekistan

Production volume 2023/24	12.4 mn bales (export)	30.1 mn bales (prod.)	621,000 MT
Mechanization rate	>90%	~40%	~20%
Technology adoption	High (precision ag.)	Medium-High	Low-Medium
Sustainability cert. coverage	Medium	Medium-High (BCI)	Growing (post-2022)
Value chain integration	Medium (raw fiber dominant)	High (yarn to garment)	High (strong upgrade)
Export market diversity	High (global)	High (global)	Limited (CIS-heavy)
Key competitive advantage	Scale, low cost	Skilled labor, scale	Cluster policy, raw material
Key vulnerability	Trade policy (US-China)	Weather, yield decline	Mechanization, market conc.

Table 4. Comparative competitiveness matrix: Brazil, India, and Uzbekistan. Sources: USDA GAIN (2024); Coherent Market Insights (2026); Daryo News (2024).

The comparative analysis reveals that no single factor determines competitiveness; rather, sustained competitive advantage emerges from simultaneous progress across multiple dimensions. Brazil's cost competitiveness through scale and technology is offset by vulnerability to bilateral trade disputes. India's value chain depth is threatened by declining production volumes — a 7.84% production decrease in 2023 transformed India from a net exporter to a net importer of cotton (Coherent Market Insights, 2026). Uzbekistan's policy-driven transformation has generated remarkable export growth, but the concentrated market structure and low mechanization represent systemic risks requiring urgent structural reform.

5. DISCUSSION

5.1 Synthesis of Competitiveness Factors

The results confirm that cotton fiber competitiveness in the contemporary textile industry is a multi-dimensional construct not reducible to production cost alone. Quality differentiation, sustainability positioning, and value chain integration collectively constitute the dominant competitive frontier. The empirical evidence suggests a hierarchy among these factors: for commodity-grade producers competing on cost, technology adoption in cultivation and processing is paramount. For producers seeking access to premium markets — particularly in the EU and North America — sustainability certification and compliance with emerging regulatory frameworks (such as the EU Corporate Sustainability Due Diligence Directive) are becoming non-negotiable.

The synthetic fiber threat, while real, should be reframed as a market segmentation driver rather than an existential challenge. Polyester's dominance in performance sportswear, fast fashion, and industrial applications does not necessarily encroach on cotton's stronghold in premium apparel, home textiles, and health-sector end-uses, where breathability and hypoallergenicity are valued.

More than 62% of apparel shoppers in developed markets prefer cotton for everyday wear (Dataintelo, 2026), providing a durable demand foundation for producers who can differentiate credibly.

5.2 Policy Implications for Uzbekistan and Comparable Economies

Based on the foregoing analysis, six strategic policy recommendations emerge for cotton fiber competitiveness enhancement in developing economies:

First, accelerate mechanization through targeted subsidies and credit access for cotton harvesting machinery. Raising Uzbekistan's mechanization rate from 20% toward 60–70% would substantially improve fiber quality consistency and reduce reliance on seasonal labor, directly enhancing export competitiveness in demanding EU and North American markets.

Second, establish a national fiber quality infrastructure including HVI testing laboratories, certified classing services, and a transparent grading system aligned with international standards (ASTM D1440). Quality-segmented pricing would incentivize farmer investment in fiber quality.

Third, expand sustainability certification coverage by establishing a nationally coordinated program for BCI and GOTS certification, backed by capacity-building support for farmer clusters. Given the resolution of the forced labor concern, Uzbekistan's cotton is now certifiable under major international standards, representing an underutilized competitive asset.

Fourth, actively pursue market diversification toward the EU and the United States. Current export concentration in CIS markets — with Russia absorbing 64% of fabric exports — creates significant geopolitical and economic vulnerability. The Presidential decree targeting USD 500 million in EU and US export revenues by 2028 is directionally correct but requires systematic follow-through through trade promotion, certification support, and regulatory compliance assistance.

Fifth, invest in research and development for high-value cotton varieties, including extra-long staple breeding programs appropriate to Uzbekistan's climate conditions. Extra-long staple fibers command price premiums of 2–3 times standard grades, and Uzbekistan's existing fiber processing capacity of 1.3 million tonnes per year exceeds current domestic supply of 1 million tonnes, indicating underutilized capacity that could be filled by higher-quality domestic production.

Sixth, develop robust price risk management mechanisms including futures market access for farmer clusters, price stabilization funds, and diversified buyer portfolio development to reduce vulnerability to single-market price shocks.

6. CONCLUSION

This article has systematically examined the determinants of cotton fiber competitiveness in the global textile industry, drawing on comprehensive empirical data from 2017 to 2024. The analysis confirms that competitiveness is governed by five mutually reinforcing factors: raw material quality and supply chain reliability; technology adoption in cultivation and processing; sustainability certification and environmental positioning; value chain integration toward high-value finished products; and effective price risk management within stable institutional frameworks.

The global competitive landscape is characterized by structural tension between cotton's market share erosion to synthetic fibers (from ~25% to 19% over two decades) and the strong, durable consumer preference for natural fibers in premium apparel and home textile segments. This tension creates both threats and strategic opportunities: cotton-producing nations that can credibly combine quality, sustainability, and processing depth will secure defensible competitive positions in expanding premium market segments.

The Uzbekistan case provides compelling evidence of the transformative potential of coordinated industrial policy. The country's textile export growth from USD 6 million in 2017 to

USD 3.1 billion in 2023 — representing a 500-fold increase in six years — demonstrates that developing economies can achieve rapid competitiveness enhancement through cluster-based vertical integration, foreign investment attraction, and systematic product upgrading, even in the face of global commodity price volatility.

However, the sustainability of this trajectory requires addressing structural vulnerabilities: the 20% mechanization rate constraining quality and supply reliability, the concentrated export dependence on CIS markets, and the limited share of high-value-added products in total exports. Future research should quantify the relative elasticities of these competitiveness factors through econometric modeling, and investigate the enabling conditions under which developing-country textile exporters successfully penetrate EU and North American premium market segments.

REFERENCES

1. Birnbaum, D. (2008). Birnbaum's Global Guide to Winning the Great Garment War. Hong Kong: Third Horizon Press.
2. Boston Consulting Group (BCG). (2023). Uzbekistan Textile Industry Assessment. Cited in Daryo News, April 16, 2024.
3. Coherent Market Insights. (2026). Cotton Fiber Market Share & Opportunities Report 2026–2033. Retrieved from coherentmarketinsights.com.
4. Cotton Association of India (CAI). (2024). Annual Cotton Production Estimate, Season 2023–24.
5. Dataintelo. (2026). Cotton Fabric Market Research Report 2034. Retrieved from dataintelo.com.
6. Daryo News. (2024, April 16). Uzbekistan's textile exports reach $3.1bn in 2023. Retrieved from daryo.uz.
7. Daryo News. (2023, December 18). Uzbekistan's cotton sector 2023: 621,000 metric tons production and $200mn investment. Retrieved from daryo.uz.
8. Gereffi, G., & Memedovic, O. (2003). The global apparel value chain: What prospects for upgrading by developing countries? United Nations Industrial Development Organization (UNIDO), Vienna.
9. Grand View Research. (2024). Textile Fiber Market Report. Retrieved from grandviewresearch.com.
10. Introspective Market Research. (2025). Cotton Textile Market Size, Competitors, Trends & Forecast to 2033. Retrieved from introspectivemarketresearch.com.
11. Kaplinsky, R., & Morris, M. (2001). A handbook for value chain research. Ottawa: IDRC.
12. Krugman, P. (1994). Competitiveness: A dangerous obsession. Foreign Affairs, 73(2), 28–44.
13. Porter, M. E. (1990). The Competitive Advantage of Nations. New York: Free Press.
14. Renub Research. (2024). Global Cotton Market Analysis Growth Trends 2025–2033. Retrieved from renub.com.
15. Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production, 16(15), 1699–1710.
16. Technavio. (2024). Cotton Market Growth Analysis — Size and Forecast 2026–2030. Retrieved from technavio.com.
17. Textile Exchange. (2024). Materials Market Report 2024. Lamesa, TX: Textile Exchange.
18. Textile Exchange. (2025). Materials Market Report 2025. Lamesa, TX: Textile Exchange.
19. United Nations COMTRADE. (2025). Uzbekistan Exports of Cotton, 2024. Retrieved from tradingeconomics.com/uzbekistan/exports/cotton.