



INNOVATION DEVELOPMENT AND TECHNOLOGICAL MODERNIZATION IN TEXTILE ENTERPRISES: EVIDENCE FROM BAKAN TEX LLC

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Abstract: Innovation development and technological modernization are important factors in increasing the competitiveness of textile enterprises. This study analyzes the practical experience of BAKAN TEX LLC, one of the export-oriented textile enterprises in Uzbekistan. The research is based on the empirical results of the author's master's dissertation and focuses on the company's technological capacity, production performance, automation, export activity and prospects for further innovation development. The analysis shows that BAKAN TEX has an annual production capacity of 14,500 tons of cotton yarn and approximately 96% of its production processes are automated. The company uses modern equipment from leading European manufacturers and exports more than half of its products to international markets. The study also identifies several limitations, including limited product diversification and the concentration of production mainly on cotton yarn. Based on the obtained results, the paper proposes technological modernization, digitalization, product diversification, human capital development and export expansion as the main directions for strengthening the company's innovation development.

Keywords: innovation development, technological modernization, textile industry, automation, digitalization.

BAKAN TEX LLC is an export-oriented textile enterprise specializing in the production of 100% cotton yarn. The company's production system is based on modern spinning technologies and highly automated processes. According to the author's research, approximately 96% of the company's production processes are automated. The enterprise uses open-end and compact spinning technologies and produces different types of cotton yarn.

The high level of automation is one of the most important indicators of the company's technological modernization. Automation contributes to improving production consistency, reducing the influence of human error and increasing the efficiency of production operations. It also creates a foundation for the further introduction of digital production management and intelligent technologies.

The technological base of BAKAN TEX includes equipment



manufactured by leading European companies such as Trutzschler, Zinser, Saurer, Schlafhorst, Neuenhauser and Stienmann. The company also uses USTER technologies for quality control and has held the Oeko-Tex Standard 100 certification since 2018.[3]

The use of advanced quality-control technologies is particularly important for an export-oriented enterprise. USTER describes its yarn-testing systems as tools for monitoring yarn quality throughout the spinning process, while its quality-management solutions combine laboratory and in-line process control.[4] Therefore, the use of such technologies contributes to maintaining consistent product quality and meeting the requirements of international customers.

Another important result of the analysis concerns the production capacity of the enterprise. BAKAN TEX has an annual production capacity of approximately 14,500 tons. The company's official website also notes that its production capacities are highly utilized and that its products are supplied to several international markets.

According to the calculations conducted in the master's dissertation, production increased from approximately 13,800 tons in 2023 to 14,200 tons in 2024 and reached approximately 14,500 tons in 2025. Based on average international cotton-yarn prices, the estimated revenue was approximately USD 37.9 million in 2023, USD 45.0 million in 2024 and USD 44.9 million in 2025.

It is important to emphasize that these revenue figures are calculated estimates rather than official audited financial statements. The calculations demonstrate the economic scale of the enterprise's production capacity and illustrate the influence of international cotton-yarn prices on potential revenue.

Table 1. Production and estimated revenue of BAKAN TEX LLC

Year	Production, (tons)	Estimated revenue, in USD
2023	13800	37922400
2024	14200	45028200
2025	14500	44919405

The export orientation of BAKAN TEX represents another important element of its innovation development. More than 50% of the company's products are exported to foreign markets. The export geography includes Poland, Russia, Türkiye, China, Egypt, Portugal, North Macedonia, Pakistan and Kyrgyzstan.

Such geographical diversification provides the company with access to different markets and reduces dependence on a single foreign market. At the



same time, export orientation increases the requirements for product quality, technological efficiency, certification and delivery reliability.

The research also identified several weaknesses in the current development model. In particular, the company is mainly focused on cotton-yarn production, while the production of finished textile products remains relatively limited. This creates an opportunity for further diversification and movement toward higher value-added products.

Another important direction is digitalization. Although the existing level of automation is already high, further implementation of digital technologies could improve real-time production monitoring, data analysis, predictive maintenance and resource management. The transition from simple automation toward data-driven production management could therefore become an important next stage of the company's innovation development.

Human capital also represents an important component of the innovation system. The research showed that BAKAN TEX cooperates with higher education institutions and has established conditions for practical training and professional development. Such cooperation creates opportunities to combine academic knowledge with practical industrial experience and can contribute to the development of qualified specialists.

Based on the obtained results, the innovation development of BAKAN TEX can be strengthened through five interconnected directions: technological modernization, digitalization, product diversification, human capital development and export market expansion.

Technological modernization should remain a continuous process because the competitiveness of textile production depends significantly on the efficiency and technological level of equipment. Digitalization should complement existing automation by introducing more advanced data-based monitoring and decision-making systems.

Product diversification is particularly important because dependence on a single product category increases exposure to changes in international cotton-yarn prices. The development of finished textile products could increase value added and reduce this dependence.

Finally, export development should focus not only on increasing physical sales but also on entering new markets and increasing the share of higher-value-added products.

The analysis of BAKAN TEX LLC demonstrates that technological modernization has already become an important foundation of the company's innovation development. The enterprise has a production capacity of 14,500 tons per year, approximately 96% automation of production processes, modern European equipment, international quality-control technologies and a



diversified export geography.

The practical results also show that the company's production volume increased during 2023–2025, while estimated revenue remained strongly influenced by international cotton-yarn prices. This indicates that increasing production capacity should be accompanied by product diversification and the development of higher-value-added products.

The main directions for further innovation development should therefore include continuous technological modernization, deeper digitalization, development of finished textile products, strengthening university–industry cooperation, and expansion of international markets.

The experience of BAKAN TEX demonstrates that innovation development in textile enterprises should be understood as an integrated process combining technology, production, human capital, quality management and international market development. Such an approach can contribute to increasing the competitiveness and long-term sustainability of textile enterprises in Uzbekistan.

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