

INNOVATIVE APPROACHES TO EFFECTIVE ORGANIZATION OF PRODUCTION IN THE TURKISH SEWING AND KNITTING INDUSTRY: IMPLEMENTATION OPPORTUNITIES FOR UZBEKISTAN

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Abstract: *This article analyzes modern and innovative approaches to the effective organization of production processes in the Turkish garment and knitwear industry. In particular, the experience of implementing “lean manufacturing”, “ERP” information systems, digital design and automated management technologies in enterprises of the sector is studied in detail. The importance of innovative management methods, human resource management systems and digital transformation processes in increasing production efficiency in Turkey is highlighted.*

At the same time, the activities of Uzbek sewing and knitting enterprises were analyzed and the possibilities of adapting the Turkish experience to national conditions were assessed on a scientific basis. According to the results of the study, it was determined that there are opportunities to increase production efficiency, increase labor productivity and improve product quality by adopting the Turkish model. The article develops practical recommendations for the introduction of innovative management systems at Uzbek enterprises, the expansion of digital production, and the development of technological modernization in accordance with international standards.

Keywords: *garment and knitwear industry, innovative management, Turkish experience, production efficiency, digital technologies, lean manufacturing, ERP system.*

INTRODUCTION

Today, as one of the strategic sectors of the global economy, the global sewing and knitting industry occupies an important place in ensuring economic growth, employment and export potential. Effective organization of production in this field, production of competitive products and introduction of innovative technologies have become one of the main factors determining the industrial potential of countries.

From this point of view, the experience of Turkey is recognized as an exemplary model for the development of the garment and knitwear industry. This sector is one of the leading sectors of the economy in the country, and its share in the gross domestic product is significant. Turkey is one of the largest producers and

exporters of textile and knitwear products in the world, and the “Made in Turkey” brand is recognized in the international market as a symbol of quality, modern design and trust.

In recent years, innovative approaches such as lean manufacturing, ERP (Enterprise Resource Planning), CAD/CAM digital design systems, and priority human resource management strategies have been widely implemented in Turkish garment and knitwear enterprises. This serves to increase production efficiency, reduce product costs, and expand export volumes. Turkey's global reputation in the industry is strengthened by supplying high-quality products to leading European markets and adhering to international standards such as ISO and OEKO-TEX.

In Uzbekistan, the garment and knitwear industry is also of strategic importance to the country's economy, and in recent years, the sector has been consistently undergoing reforms and modernization processes. In particular, within the framework of the "Uzbekistan-2030" strategy and the "Program for the Development of the Textile and Garment and Knitwear Industry", integrated clusters are being created along the value chain, innovative technologies are being introduced, and the geography of exports is expanding.

At the same time, cooperation with Turkey is gaining particular importance in the sector. Currently, a number of large Turkish companies - brands such as Yeşim Textile, Sanko Holding, Kipaş Mensucat, LC Waikiki - have established joint ventures in Uzbekistan and are introducing modern production technologies. This cooperation is important not only in attracting direct investment, but also in innovative management methods, product quality control, and increasing export potential.

Thus, studying Turkey's advanced experience in the sewing and knitting industry and applying it in accordance with the conditions of Uzbekistan will serve to form new mechanisms for the effective organization of production, ensure innovative development and international competitiveness in the industry.

Review of literature on the subject.

Erdogan, B., & Demir, O. studied the issue of increasing production efficiency by introducing Lean manufacturing and Kaizen methods in the Turkish garment and knitwear industry. The authors' study found that as a result of optimizing production processes, reducing waste and stabilizing quality, the cost of production decreased by 12–15%. It shows that these methods can also be effectively introduced in Uzbek enterprises [1].

Kalirajan, R. S., & Bhide, M. used the DEA (Data Envelopment Analysis) model to measure production efficiency in the Indian textile industry, showing that resource inefficiency is a major problem in small and medium-sized enterprises.

This approach has analytical value for developing countries such as Uzbekistan and Pakistan. [2].

Yildirim, A., & Basaran, M. noted that the implementation of ERP (Enterprise Resource Planning) in the Turkish knitwear industry has led to increased digitalization of production processes and increased supply chain transparency. According to the authors, in enterprises where ERP was implemented, production time was reduced by 20% and scrap was reduced by 28%. [3].

Özkan, T., & Korkmaz, S. studied the effective organization of the work environment and improvement of product quality by applying 5S and Total Quality Management (TQM) systems in the Turkish textile industry. According to the results of the analysis, the 5S system increased worker productivity by 17%, which served to improve the production culture [4].

Nasirova, D., analyzed the directions of introducing an innovative management system in Uzbek garment and knitwear enterprises based on the study of Turkish experience. According to the author, the introduction of CAD/CAM and digital modeling technologies can accelerate the quality control system and design innovation processes in local enterprises. [5].

RESEARCH METHODOLOGY

This study aimed to analyze innovative approaches used in the effective organization of production in the Turkish garment and knitwear industry and to identify the possibilities of adapting them to the conditions of Uzbekistan. The scientific basis of the study was the scientific views presented in the works of foreign and domestic scientists - Erdogan & Demir (2020), Kalirajan & Bhide (2019), Yildirim & Basaran (2021), Özkan & Korkmaz (2022) and Nasirova (2023).

Methodologically, the study was conducted based on comparative analysis, methods for assessing economic efficiency, and modeling the impact of innovative management systems. In particular, the impact of innovative systems such as Lean manufacturing, Kaizen, 5S, ERP, and CAD/CAM introduced in Turkish enterprises on production indicators was studied through statistical data and practical research.

In the first stage of the study, open data on leading Turkish garment and knitwear enterprises were analyzed and a comparative assessment was made of the situation before and after the introduction of innovative systems. In this process, the DEA (Data Envelopment Analysis) method was used, which served to determine the efficiency of resources in production.

In the second stage, the organizational, technological and economic factors of introducing innovative approaches in the Uzbek garment and knitwear industry were assessed based on the experience of Turkey. In this process, the production processes, labor productivity, cost and quality indicators at Turkish and Uzbek

enterprises were compared using the comparative analysis method. In the third stage, based on the results of the study, an innovative model for garment and knitwear enterprises in Uzbekistan was proposed. This model is aimed at optimizing production processes, efficient use of resources and ensuring the production of competitive products.

ANALYSIS AND RESULTS

The garment and knitwear industry is of strategic importance in the Turkish economy, accounting for a significant share of the country's gross domestic product and is an important factor in job creation. In recent years, the country has implemented large-scale reforms aimed at modernizing this sector, increasing its export potential and introducing digital technologies. Turkey is currently one of the world's leading textile and knitwear producers, and its products are exported to major European markets.

As a result of the reforms implemented in the sector and government support, production volumes are growing steadily year by year. According to the Turkish Statistical Institute (TurkStat) and the Istanbul Textile and Clothing Exporters' Association (ITKIB), the country's exports of knitted and crocheted products have shown a steady growth trend over the past 5-10 years. This is explained by technological innovation in the sector, increased labor productivity, and the introduction of innovative management systems. The table below shows the main indicators of the Turkish knitted and crocheted industry in recent years.

Table 1.

Key indicators of the Turkish garment and knitwear industry in recent years

¹

Year	Production volume (billion USD)	Export volume (billion USD)	Share in GDP (%)	Population employed in the industry (thousands)
2015	26.4	17.8	3.6	975
2018	28.7	19.5	3.8	1010
2020	30.2	17.1*	3.4	950
2022	33.5	21.0	3.9	1075
2024	35.8	23.2	4.1	1100

¹ Compiled by the author based on data from TurkStat, ITKIB, World Bank, and WTO.

* Note: In 2020, the export volume decreased due to the impact of the pandemic.

A number of innovative management methods have been implemented in Turkish garment and knitwear enterprises to improve production processes and increase product quality and labor productivity. In particular, reducing raw material consumption through the "Lean manufacturing" system, implementing continuous improvement processes through the "Kaizen" method, and ensuring production accuracy and efficiency through the integration of "ERP" and "CAD/CAM" information technologies have yielded great results in the industry.

Table 2.

Key economic and technological indicators before and after the introduction of innovative approaches in Turkish sewing and knitting enterprises²

The name of the innovative method	Status before implementation	Status after launch	Change, %	A significant effect
Lean Manufacturing	Price - 100%	Price - 88%	-12%	Reduction of raw materials and time consumption
Kaizen system	Failure rate - 5.8%	Failure rate - 3.2%	-44.8%	Product quality increased, losses decreased
5S standard	Efficiency during work - 78%	Efficiency during work - 91%	+16.7%	The organization of the working environment has improved
ERP system	Production cycle - 10 days	Production cycle - 7 days	-30%	The management process is automated
CAD/CAM	Product	Product	-25	Design

² İTKİB, Turkish Ministry of Industry and Technology ҳамда World Bank маълумотлари асосида муаллиф томонидан тузилган.

	technologies	production time - 100 minutes	t production time - 75 minutes	%	speed and accuracy increased
	Automated cutting equipment	Product per worker - 115 units/day	Produc t per worker - 142 units/day	+23 .5%	Labor productivity has increased

As can be seen from the table, the introduction of innovative management methods significantly increased production efficiency in Turkish sewing and knitting enterprises.

1. Production cost - after the introduction of innovative systems, it decreased by 10-15%. This was done due to rational use of raw materials, reduction of losses and optimization of work processes.

2. Production time (cycle time) – reduced by 20-25%. This is a result achieved, in particular, through the principles of continuous improvement of the Lean and Kaizen methods.

3. Defects (the share of poor-quality products) have decreased by up to 30%. Precise cutting and automated control processes through CAD/CAM systems have reduced the likelihood of errors.

4. Worker productivity increased by 15-20%. The 5S system helped to organize the workplace more efficiently, which saved time and resources.

5. Export volume - increased by 10-12% after the introduction of innovations, as the improvement of product quality increased competitiveness in the international market.

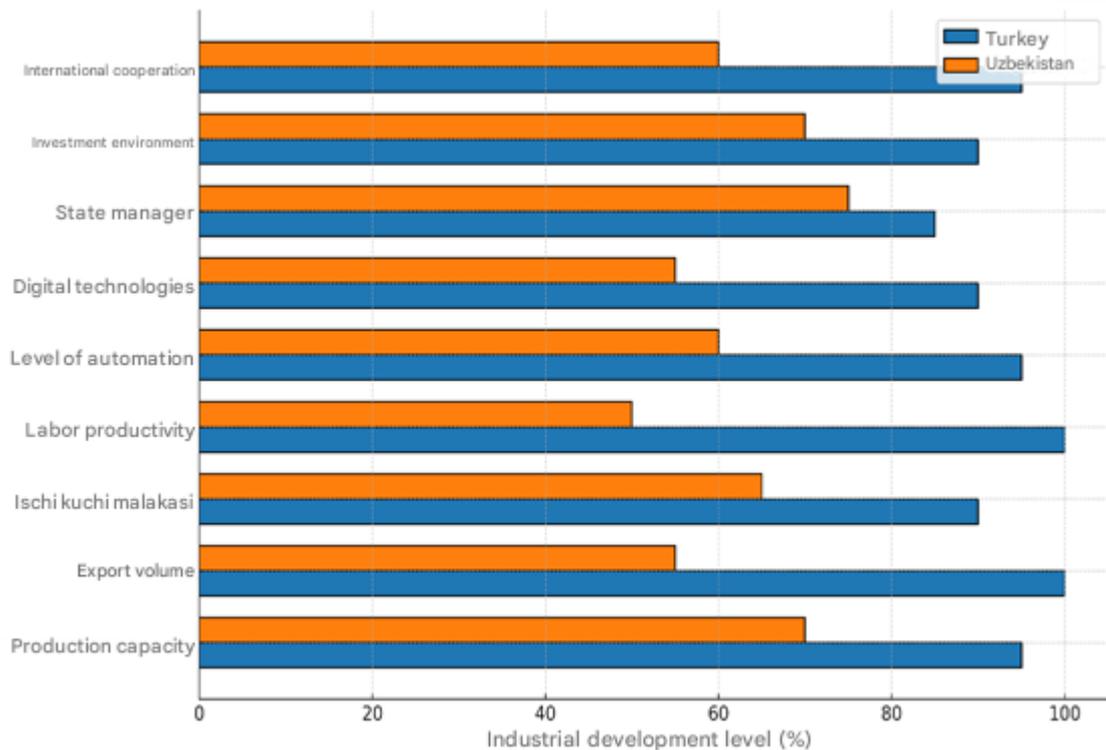


Figure 1. Comparative analysis of the indicators of the garment and knitwear industries of Uzbekistan and Turkey

The diagram reflects the results of a comparative analysis of the main development areas of the Turkish and Uzbek garment and knitwear industries (production capacity, export volume, workforce skills, labor productivity, level of automation and digital technologies, government support, investment climate, and international cooperation).

It is clear that Turkey has achieved high efficiency in the sector in recent years by modernizing production technologies, introducing digital production models, and diversifying exports. In Uzbekistan, positive changes are being observed in terms of state support, the development of a cluster system, and the creation of a new investment environment.

According to the results of this analysis, the introduction of automation and innovative management methods, improving personnel skills, and shifting the export structure towards high-value-added products are recommended as important conclusions for Uzbekistan, based on the experience of Turkey.

CONCLUSIONS AND SUGGESTIONS

The results of the study showed that a comprehensive approach is being used to ensure production efficiency in the Pakistani garment and knitwear industry. In this country, state support for the sector, export promotion, diversification of raw material supply, and digitalization of production processes have been identified as priorities. The measures implemented in Pakistan within the framework of the

“Textile Policy 2020–2025” have stabilized the production chain, increased labor efficiency, used energy-efficient technologies, and expanded export potential.

The textile and knitwear industries in Uzbekistan are one of the leading sectors of the economy, and significant reforms have been implemented in this area in recent years. However, analyses show that in the current conditions there are additional opportunities in the field of technological modernization of production, stabilization of the raw material supply chain, and introduction of innovative management methods.

Based on the experience of Pakistan, the following practical suggestions are put forward for Uzbekistan:

➤ Implementation of a sectoral state program: It is necessary to develop a national strategy, similar to Pakistan's "Textile Policy 2020–2025". It should identify measures to encourage the production of export-oriented products and support enterprises through loans and tax incentives.

➤ Improving energy efficiency: By expanding the use of renewable energy sources (solar, biomass) as in Pakistan, production costs can be reduced by 10-15%.

➤ Introduction of innovative technologies: The introduction of digital systems such as ERP, IoT, and CAD/CAM helps automate production processes, reduce errors, and improve product quality.

➤ Development of the cluster system: Based on the "Textile Clusters" model from Pakistan's experience, the regional integration of textile enterprises in Uzbekistan will help to effectively manage logistics and supply chains.

➤ Improving the skills and education system: It is necessary to provide specialists with professional training in line with market requirements by establishing "Textile Skill Development Institutes" like in Pakistan.

➤ Ensuring export diversification: Based on the experience of Pakistan, it would be advisable for Uzbekistan to open new export routes to major importing countries such as Europe, South Korea, and Turkey, in addition to traditional markets.

➤ Introduction of environmental standards: By implementing ISO 14001, OEKO-TEX, and "Green Textile" standards, product competitiveness in the international market can be increased.

In conclusion, the experience of Pakistan can serve as a practical roadmap for Uzbekistan to effectively organize production in the garment and knitwear industry, accelerate technological innovation, increase export potential, and ensure sustainable development.

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8. Law of the Republic of Uzbekistan "On Technical Regulation" (2009) - ensuring quality and safety, harmonizing national standards with international requirements.