

EFFICIENCY OF ORGANIZING RESOURCE-EFFICIENT PRODUCTION IN TEXTILE INDUSTRY ENTERPRISES

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Abstract. *The article examines the issues of economic efficiency achieved in the reduction of production costs of the use of digital technologies in the organization of resource-saving production in textile industry enterprises.*

Keywords. *Market economy, textile industry, sustainable development, resource saving, economic efficiency.*

The textile industry is the main driver of the Uzbek economy, as it allows for a multi-fold increase in value added by creating a complete chain of processing raw cotton within the country. As the most labor-intensive sector, this sector plays a crucial socio-economic role in providing employment for millions of people (especially in rural areas). Exports of finished textile products are a strategic source of stable foreign exchange earnings for the country.

However, today there are serious objective obstacles to reducing the cost of Uzbek textile products. Firstly, the country's remoteness from seaports ("double landlocked") sharply increases transport and logistics costs. Secondly, the instability of the supply of energy resources (electricity and gas) leads to disruptions in the rhythm of production and additional technological losses. Thirdly, the dependence of dyes and chemicals on imports makes the cost extremely sensitive to exchange rates.

Since it is impossible to change the above external factors in the short term, the only effective way to reduce costs is to use internal reserves and increase resource efficiency. Therefore, the main purpose of this article is to analyze the impact of digital transformation on costs in Uzbek textile enterprises [1]. The study highlights the possibilities of minimizing operating costs by accurately controlling raw material and energy consumption and predicting technological waste using ERP systems, Artificial Intelligence (AI) and the Internet of Things (IoT).

Uzbek scientist R.A. Isaev studied the issues of improving organizational and economic mechanisms for implementing strategies for sustainable development of the textile industry [2].

The issue of optimizing production costs within the framework of the Industry 4.0 concept in the global economy has been studied by many foreign scientists, in particular K. Schwab, M. Porter [3]. In their opinion, each link in the digital transformation chain serves to reduce additional costs in the process, from the supply of raw materials to the sale of finished products [4].

To assess the effectiveness of digital technologies, it is first necessary to understand how the cost of production is formed at Uzbek textile enterprises [5]. Analyses show that the bulk of costs in the production of yarn and fabric - on average 60-70 percent - falls on raw materials (cotton fiber, chemical fiber). Energy costs account for 10-15 percent, and labor and other operating costs account for the rest.

Therefore, the main resource for reducing costs is to eliminate raw material waste and increase energy efficiency. In our research, we studied the impact of the use of resource-efficient digitalization technologies on the cost of product production in industrial enterprises, in particular, in the textile industry, in increasing the level of resource utilization (Table 1).

Table 1

Results of the impact of the use of digital technologies on the cost of production¹⁴

Digital technology	Scope	Economic effect (cost impact)
CAD/CAM systems	Planning and design	Reduces raw material waste by 10-15%
ERP systems	Warehouse and Finance	Saves up to 20% on working capital
IoT and Smart Sensors	Energy and Equipment	Reduces electricity consumption by 15-18%
AI (Artificial Intelligence)	Quality control	Eliminates waste by identifying 90% of defective products and eliminating costs

Results of the analysis of the data in Table 1:

A) Alternative storage through ERP systems:

In many cases, warehouse stocks (raw materials and finished products) are not adequately controlled at local enterprises. This leads to an increase in "frozen capital". Modern ERP (Enterprise Resource Planning) systems (for example, SAP, 1C:ERP) integrate production, finance and logistics into a single chain.

B) Smart sensors (IoT) and energy efficiency. Manufacturing is a promising area of digitalization in inventory management, as is the Internet of Things (IoT), or the system of connecting digital devices into a common network that exchanges information without human intervention. According to Cisco estimates, "IoT technologies will generate assets of about \$8.0 trillion in the next decade, of which \$1.9 trillion will fall on the logistics network" [6].

¹⁴Muallif ishlanmasi.

Textile machines (spinning, weaving, dyeing) consume a lot of electricity. As part of the Internet of Things (IoT) technology, “smart meters” and sensors are installed on each machine. They detect when the equipment is idle [7].

C) Artificial Intelligence (AI) and Quality Control:

Computer Vision systems detect even the smallest defect in the fabric (spot, thread break) in milliseconds and stop the machine.

D) CAD/CAM systems – a guarantee of raw material savings:

In sewing workshops, automated design systems (CAD) place patterns on the surface of the fabric in such a way that waste (cuts) is minimized [8].

Based on the results of the research, the following conclusions and proposals were made to ensure the sustainable development of enterprises of the textile industry of the Republic of Uzbekistan in the future and reduce their costs through the effective use of resource-saving technologies based on digital transformation:

- Reduces excess inventory by 20-30% through accurate forecasting of raw material demand as a result of inventory substitution through ERP systems. This frees up the company's working capital and ensures increased production activity;
- Use of "smart" sensors (IoT) and solar energy to ensure energy efficiency allows reducing energy costs by 12-15%;
- The introduction of artificial intelligence (AI) and quality control systems into production activities will eliminate the production of "scrap" products and save processing costs;
- the use of CAD/CAM systems in primary production will allow reducing raw material waste by 10-15 percent compared to manual labor;
- introduction of cost-effective technologies based on the principles of "green economy" in textile enterprises;
- development of an effective quality management system in textile enterprises and its implementation in practice to establish the production of competitive product types;
- increasing export potential by applying the "GSP+" system to textile industry practice.

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