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DIGITAL TRANSFORMATION AND PRODUCTIVITY GROWTH IN GLOBAL APPAREL VALUE CHAINS

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Abstract

This study analyzes the impact of digital transformation on productivity growth in global apparel value chains. The study focuses on the application of advanced technologies such as artificial intelligence, automation systems, and digital supply chain platforms in the textile and garment industry. In the context of globalization, apparel production is organized through complex international networks, where efficiency depends on coordination, information flow, and technological integration. The research is based on the analysis of international reports and academic literature from organizations such as McKinsey Global Institute, ILO, and World Bank. The findings show that digital transformation improves productivity by reducing production costs, minimizing delays, and increasing flexibility in manufacturing systems. In addition, automation and data-driven decision-making enhance quality control and resource optimization. The study concludes that digital technologies are a key factor in improving competitiveness and long-term efficiency in the global apparel industry.

Keywords: Digital transformation, apparel industry, productivity growth, global value chains, automation, supply chain management, Industry 4.0, artificial intelligence



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Introduction

The global apparel industry is one of the most competitive and fast-changing sectors of the world economy. It is characterized by fragmented production networks, short product life cycles, and rapidly changing consumer demand. According to McKinsey Global Institute, digital technologies are transforming global manufacturing by enabling real-time data exchange and integrated production systems. Traditionally, apparel production relied on manual processes and linear supply chains, which often led to inefficiencies and delays. However, the introduction of Industry 4.0 technologies has significantly changed this structure. Today, companies increasingly use automation, artificial intelligence, and digital platforms to improve coordination and efficiency. As a result, digital transformation has become a key factor influencing productivity and competitiveness in the apparel industry. Understanding its impact is essential for analyzing modern industrial development trends.

Main part

Digital transformation in the apparel industry refers to the integration of advanced digital technologies into all stages of production and supply chain management. These technologies include artificial intelligence (AI), Internet of Things (IoT), cloud computing, and automated manufacturing systems. Together, they create a highly connected production environment that improves efficiency and reduces operational costs.

One of the main effects of digital transformation is the improvement of supply chain management. In traditional systems, communication between suppliers, manufacturers, and retailers is often slow and fragmented. This leads to delays, high inventory levels, and inefficient resource allocation. Digital platforms solve



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these problems by enabling real-time data sharing across all stages of production. As a result, companies can better synchronize production with market demand. Automation is another important factor. Automated sewing machines, robotic cutting systems, and digital quality control technologies reduce human error and increase production speed. According to the International Labour Organization, automation can significantly increase productivity in manufacturing industries, especially in labor-intensive sectors such as textiles.

Artificial intelligence also plays a critical role in demand forecasting. AI systems analyze large datasets, including consumer behavior and market trends, to predict future demand more accurately. This helps companies reduce overproduction and minimize waste.

In addition, digital transformation improves quality control systems. Sensor-based monitoring and computer vision technologies allow real-time detection of defects, improving product quality and reducing production losses.

Table 1. Impact of Digital Transformation on Apparel Industry

Indicator	Traditional system	Digital system
Productivity	Medium	High
Production cost	High	Low
Supply chain speed	Slow	Real-time
Forecast accuracy	Low	High

The table shows that digital transformation significantly improves all key performance indicators. The most important improvements are seen in production cost reduction and supply chain speed. This indicates that digital technologies not only improve internal efficiency but also enhance external market responsiveness. Higher forecast accuracy also reduces uncertainty in production planning, allowing better resource allocation.



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Furthermore, digital transformation changes labor structure in the industry. Routine tasks are increasingly automated, while demand for skilled workers in data analysis and digital system management is growing. This shift increases overall productivity but also requires investment in workforce training and education.

Overall, digital transformation creates a more flexible and efficient production system, which is essential for competitiveness in the global apparel industry.

Conclusion

Digital transformation significantly improves productivity in global apparel value chains by integrating artificial intelligence, automation, and digital supply systems. These technologies increase efficiency, reduce costs, and enhance coordination across international production networks. They also improve forecasting and quality control, helping firms remain competitive in the fast-changing fashion industry. However, successful implementation requires investment in both technology and employee digital skills. Overall, digital transformation is a key driver of higher productivity and global competitiveness in the apparel sector.

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