



DEVELOPMENT TRENDS OF THE GLOBAL TEXTILE INDUSTRY: A COMPREHENSIVE ANALYSIS



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Abstract: *The textile industry, a cornerstone of global manufacturing, has witnessed significant transformation over the years driven by technological advancements, shifting consumer preferences, and global economic dynamics. This paper provides a comprehensive analysis of the development trends shaping the global textile industry. It examines key drivers such as technological innovation, sustainability initiatives, market demand shifts, circular economy practices, and geopolitical factors, and explores their implications for industry players. Additionally, the paper discusses emerging trends including digitalization, supply chain optimization, and the rise of smart textiles. By synthesizing insights from industry reports, academic research, and expert opinions, this paper offers valuable perspectives on the future trajectory of the global textile industry. Furthermore, embracing principles of sustainability and circular economy in textile production and consumption can pave the way for a more resilient and environmentally responsible industry. By optimizing resource utilization, minimizing waste, and prioritizing ethical and sustainable practices, the textile industry can contribute positively to economic growth, social development, and environmental stewardship on a global scale.*

Keywords: *machine unit, options, working body, process load, tension roller, roller accelerator, eccentricity, differential equations, not linear equations*

INTRODUCTION

The textile industry occupies a central position in the global economy, serving as a critical link in the supply chain of various consumer and industrial goods. Over the years, the industry has undergone significant evolution driven by technological advancements, changing consumer preferences, and sustainability imperatives. This introduction sets the stage for the paper by highlighting the importance of understanding the development trends shaping the global textile industry and outlining the structure of the subsequent sections.

The textile industry on a global scale encompasses the manufacturing, refining, and retailing of clothing. This expansive sector exerts its influence on nearly every individual worldwide. With its multibillion-dollar manufacturing sector, the global textile industry

involves the production, refining, and commercialization of both synthetic and natural fibers utilized across numerous sectors.

MATERIALS AND METHODS

The garment sector plays a crucial role in bolstering a nation's economy through income generation, serving as a significant contributor to GDP, and being instrumental in job creation. However, the industry is currently undergoing a substantial transformation due to global sourcing practices and heightened levels of cost competition. Factors such as improved demographic profiles, rising disposable incomes, shifts in consumer preferences, and a notable preference for branded clothing have contributed to a positive trajectory in the global apparel market. From its export value of 108 billion USD in 1990, the global apparel export market surged significantly to reach 600 billion USD by 2014, marking a promising growth of 150% over the past decades. Industry leaders are anticipating a further surge to 1000 billion USD by 2023, underscoring a potential market opportunity for efficient producers.

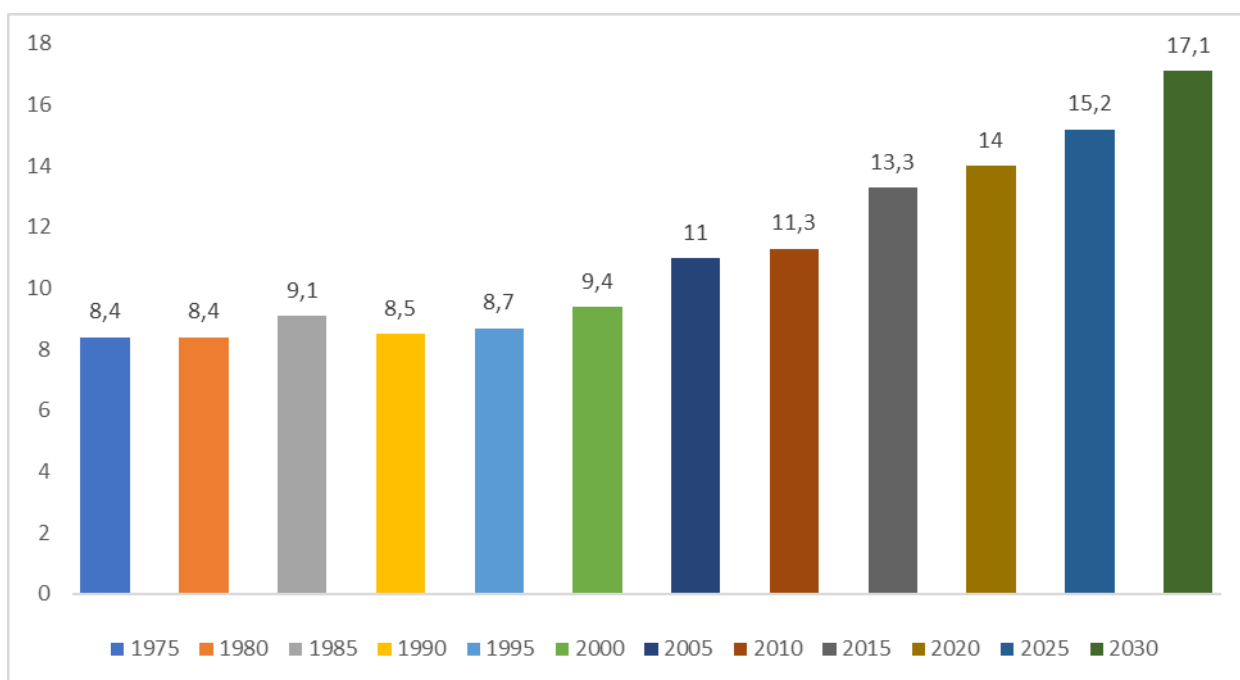


Fig.1. Production volume dynamics by global fiber content (capita/kg)

Global fiber production per person has increased from 8.4 kilograms in 1975 to 14 kilograms in 2020. As the main reason for such an almost doubling of growth, we can point to the rapid growth of the population on the planet Earth and, accordingly, the intensive increase in the demand for textile products (Fig.1.).

The factors influencing the development of the global textile industry can be conditionally divided into two categories (Table 1):

1. Controllable factors;
2. Uncontrollable factors.

Table 1. Factors affecting the development of the global textile industry

№ Controllable factors Uncontrollable (external) factors

1. Product Structural Adjustments
2. Plant and equipment Natural resources (raw materials, climate)
3. Technology Government and Infrastructure
4. Materials and energy consumption
5. The human factor
6. Work methods
7. Management style

Below, we'll consider each factor individually:

Controllable Factors (Internal Factors):

1. Product Factor: The product aspect refers to how well the product meets the production requirements from a manufacturing standpoint and is assessed based on product efficiency. It is possible to increase the profitability of a product by either increasing its utility for the same cost or reducing its cost for the same utility.

2. Plant and Equipment: Plants and equipment play a significant role in enhancing productivity in manufacturing. Increasing the efficiency of the plant through proper technical maintenance and minimizing downtime contributes to increased productivity. Enhancing productivity through utilization, age, modernization, cost, investment, and proper attention to factors like maintenance and technical services is possible.

3. Technology: Innovative and cutting-edge technologies significantly enhance productivity. Automation and information technologies aid in improving material processing, storage, communication systems, and quality control. Various technological factors that need consideration include:

- Size and capacity of the plant,
- Timely delivery and quality of input materials,
- Optimization of production and control.

4. Materials and Energy Consumption: Actions aimed at reducing material and energy consumption significantly enhance productivity.

- Selection of quality materials and proper handling.
- Monitoring and controlling waste.
- Effective management of resources.
- Optimal utilization of energy and energy conservation.

5. Human Factors: Human skills and capabilities are primarily responsible for production. Efficient working capabilities are managed through employee training, education, experience, and other factors. Employee motivation influences productivity.

6. Work Methods: Improving work methods enhances labor efficiency, and industries focused on learning and refining industrial engineering techniques and education methods significantly improve.

7. Management Approach: Organizational design, communication, policies, and procedures influence management. Adaptive and dynamic management approaches are considered the best means to achieve high productivity.

Uncontrollable Factors (External Factors):

1. Institutional Changes: Institutional changes absorb economic and social changes internally. The following economic changes significantly affect productivity:

- The transition of labor from agriculture to manufacturing,
- Imports of technology, and
- Industrial competitiveness.
- Social changes such as women's labor participation, education, social skills, and attitudes play a significant role in enhancing productivity.

2. Natural Resources: The workforce, land, and water are of paramount importance in enhancing productivity.

3. Government and Infrastructure: Government policies and regulations, state agency efficiency, transportation, and communication infrastructure are vital and tax policies (interest rates, taxes) significantly impact productivity.

Here are some directions of modern development trends of global textile industry, which is expanding year by year



Fig.2. Main directions of development trends of global textile industry

RESULTS AND DISCUSSION

Now we will look through all directions in order.

1. Technological Innovation in Textile Manufacturing

Technological innovation has revolutionized textile manufacturing processes, enabling greater efficiency, flexibility, and product innovation. This section explores key technological trends such as automation, digitalization, additive manufacturing, and advanced materials, and their impact on the industry's competitiveness and sustainability.

2. Sustainability Initiatives and Circular Economy Practices

With growing environmental concerns and regulatory pressures, sustainability has become a top priority for textile companies worldwide. This section discusses various sustainability initiatives undertaken by industry players, including the adoption of eco-friendly materials, energy-efficient production processes, waste reduction strategies, and the implementation of circular economy practices.

3. Circular Economy in the Textile Industry

The circular economy represents a paradigm shift in the way textiles are produced, used, and disposed of. This section examines the principles of circularity in the textile industry, including design for longevity, resource efficiency, product life extension, and end-of-life recycling. It explores innovative business models such as product-as-a-service, rental, and resale, as well as collaborative initiatives for closed-loop material systems and textile-to-textile recycling .

4. Market Demand Shifts and Consumer Preferences

Changing consumer preferences, influenced by factors such as fashion trends, lifestyle changes, and socio-cultural shifts, have profound implications for the textile industry. This section examines emerging market demand patterns and consumer preferences, highlighting opportunities and challenges for industry stakeholders.

5. Geopolitical Factors and Trade Dynamics

Geopolitical tensions, trade policies, and regional dynamics play a significant role in shaping the global textile industry landscape. This section analyzes the impact of geopolitical factors on trade patterns, supply chain resilience, and market access, with a focus on key regions and economies.

6. Emerging Trends: Digitalization and Smart Textiles

The emergence of digital technologies and smart textiles presents new opportunities for innovation and differentiation in the textile industry. This section explores the latest trends in digitalization, including wearable technology, smart fabrics, and the Internet of Things (IoT), and their potential applications across various market segments.

7. Supply Chain Optimization and Resilience

Efficient supply chain management is critical for the success of textile companies in an increasingly competitive and volatile global market. This section examines strategies for optimizing supply chain processes, enhancing transparency and traceability, and building resilience to external disruptions.

To thrive in this dynamic landscape, textile industry stakeholders must adopt a holistic approach that integrates efficient production processes, technological innovation, sustainable resource management, and responsive management practices. Collaboration between industry players, governments, and regulatory bodies is essential to address challenges and capitalize on opportunities in the global textile market.

Furthermore, embracing principles of sustainability and circular economy in textile production and consumption can pave the way for a more resilient and environmentally responsible industry. By optimizing resource utilization, minimizing waste, and prioritizing ethical and sustainable practices, the textile industry can contribute positively to economic growth, social development, and environmental stewardship on a global scale.

Overall, the future of the global textile industry hinges on its ability to adapt to changing market dynamics, embrace innovation, and foster collaboration across the value chain. Through strategic investments, forward-thinking policies, and a commitment to sustainability, the textile industry can navigate challenges and emerge as a driving force for economic prosperity and social progress in the years to come.

CONCLUSION

In conclusion, the global textile industry is undergoing significant transformations driven by various internal and external factors. Factors amenable to management, such as product quality, plant efficiency, technological advancements, resource management, human factors, work methods, and management approaches, offer avenues for enhancing productivity and competitiveness within the industry. However, external factors like institutional changes, natural resource availability, government policies, and infrastructure also exert considerable influence on the industry's trajectory.

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