The Impact of New Quality Productive Forces on the High-Quality Development of the Textile and Apparel Industry

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Abstract. The textile and garment industry, as an important livelihood industry in our country, is deeply integrated into the national economic system, but as a traditional industry, it is facing multiple challenges in the transformation. This article focuses on how the new quality productivity can promote the high-quality development of the textile and garment industry through three key paths: First, through technological innovation to promote the upgrading of the industrial structure, the promotion of product added value and green transformation; Second, the combination of artificial intelligence technology to improve production efficiency and promote intelligent product design; Third, by training high-quality workers to optimize human capital. The research highlights that these factors contribute significantly to continuous innovation and the high-quality growth of the textile and garment industry. Additionally, based on the findings, the article offers practical insights and recommendations for policymakers, businesses, and research institutions to support this transformation.

Keywords: New quality productivity; textile and garment industry; high-quality development.

1 Introduction

New quality productivity refers to a modern form of productivity driven by digital technology, knowledge capital, and collaborative innovation. It incorporates intelligent systems, data utilization, and eco-friendly practices, standing in contrast to traditional productivity. The term "new" signifies breakthroughs in technological advancement, economic transformation, and business model optimization. Meanwhile, "quality" highlights its core characteristic as an innovation-driven force, emphasizing continuous advancements that further enhance productivity. Compared to traditional productivity, new quality productivity is more aligned with contemporary demands. It is characterized by highly skilled talent, advanced precision equipment, and high-quality production. This approach not only boosts production efficiency but also supports green de-

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velopment, contributing to sustainable progress. Ultimately, it fosters the comprehensive growth of individuals, providing a more capable workforce and new driving forces for high-quality economic development.

The textile and garment industry is a comprehensive system that transforms natural fibers, chemical fibers, and other raw materials into finished products like clothing and apparel through processes such as spinning, weaving, printing, dyeing, design, and manufacturing. It spans the entire value chain, from raw material production to consumer markets, serving as a key link between agriculture, industrial goods, and consumer demand. As a modern industry that blends industrial manufacturing with fashion culture, it is both large-scale and labor-intensive, providing significant employment opportunities. However, as the world undergoes economic transformation and industrial upgrading, governments are actively promoting the development of new quality productivity. Despite its importance to the national economy, the textile and garment sector remains heavily reliant on traditional productivity methods. It continues to face challenges, including high labor intensity, pollution, and excessive energy consumption. Transitioning to a more sustainable and innovative model is essential for its future growth.

The high-quality development of the textile and garment industry faces several practical challenges. As a traditional sector, it holds a significant position in both the domestic and global industrial chains. With the ongoing advancements in science, technology, and economic transformation, the current state and future prospects of China's textile and garment industry have garnered widespread attention from scholars. First, while the industry has established a vast and comprehensive supply chain, it also suffers from issues like extended and poorly connected upstream and downstream processes. The lack of efficient coordination and weak supply chain management further hinder the industry's overall integration and responsiveness [1]. Second, limited technological innovation remains a major obstacle to industrial upgrading. On the one hand, the absence of breakthroughs in production technology results in low product value and reduced corporate profitability. This creates a vicious cycle where companies struggle to generate sufficient funds for further technological advancements [2]. On the other hand, the industry remains predominantly labor-intensive. Many companies lack modern automated machinery, relying heavily on manual labor. This reliance on low-cost, low-end production prevents the adoption of advanced materials and fuels a race to the bottom through cost-cutting and price competition [3]. A noticeable lack of innovation awareness further delays the industry's transition and upgrading. Additionally, the textile and garment sector faces significant environmental challenges. Processes like printing, dyeing, and material processing consume large amounts of water and energy while generating substantial pollution. Large-scale production often results in severe environmental damage, making it difficult to meet the growing demand for low-carbon, sustainable development [4]. To address the challenges facing the textile and apparel industry and achieve high-quality development, it is essential to leverage both policy support and technological advancements. In particular, new quality productivity plays a crucial role in driving innovation and transformation within the industry. However, current research on how to effectively apply and promote new quality productivity in

this sector remains limited. Further exploration in this area is necessary to develop comprehensive strategies and practical solutions for sustainable industry growth.

To address the existing research gap, this paper will examine the multidimensional impact of new quality productivity on the high-quality development of the textile and garment industry. New quality productivity has the potential to drive technological innovation, enhance production efficiency, optimize the labor structure, and increase product value. Additionally, it can facilitate the industry's transition toward a greener, more sustainable, and higher-value industrial chain. This transformation aligns with the national strategic goal of high-quality development and reflects the broader trends and demands of the global industrial landscape. Therefore, this paper will conduct an in-depth analysis of the concept and current state of new quality productivity to explore practical solutions to the industry's challenges. Special attention will be given to strategies for strengthening the industry's core competitiveness. By offering theoretical insights and practical guidance, the study aims to support the formulation of effective industrial policies, corporate strategies, and research initiatives. Ultimately, it seeks to provide actionable recommendations and valuable perspectives for the future growth and sustainable transformation of the textile and garment industry.

2 The Mechanism of New Quality Productive Forces Affecting the Development of the Industry

2.1 Technological Innovation

2.1.1 Upgrading the Industrial Structure.

Scientific and technological innovation is emerging as the core driving force behind the structural upgrading of the textile and apparel industry. Traditionally characterized by labor-intensive production and low-value output, the industry now faces mounting challenges such as rapidly shifting market demands, rising operational costs, and intense international competition. As a result, upgrading the industrial structure has become a necessary path for sustainable growth. On the production side, the adoption of automation and intelligent manufacturing technologies has transformed textile and apparel production into a more digital, flexible, and efficient process. These advanced systems enhance production efficiency, reduce design and manufacturing lead times, and enable small-batch, multi-variety, and customized production. This allows companies to swiftly adapt to evolving consumer preferences and market trends [5]. In terms of safety and quality management, technologies like intelligent sensing and precision control minimize the need for manual intervention, ensuring greater product consistency and stability. Additionally, these innovations optimize workplace conditions, enhance operational safety, and contribute to a healthier production environment [6]. From a broader industrial perspective, technological advancements are pushing the textile and apparel sector into higher value-added areas. This includes the development of intelligent supply chains, green manufacturing processes, and functional textiles with enhanced properties. By improving overall productivity and value creation, these innovations facilitate the industry's shift from traditional manufacturing to a technology-

driven modern industrial system. Ultimately, this transition strengthens the sector's competitive position in the global market, promoting long-term growth and sustainability.

2.1.2 Product's Added Value Jumps.

The integration of new technologies with the textile and garment industry is driving products toward higher added value. A key area of focus for researchers is the development of advanced materials that enhance product performance. This includes improving fabric breathability, thermal regulation, elasticity, and drape for aesthetic appeal, as well as incorporating natural, biodegradable, and eco-friendly materials to meet sustainability goals [7]. With higher-quality materials and more efficient production processes, consumers enjoy an enhanced consumption experience. This not only increases product value and boosts company profitability but also injects fresh momentum and opportunities into the industry's growth. New quality productivity plays a pivotal role in meeting the evolving and flexible demands of both enterprises and consumers through technological advancements. In response to growing consumer interest in cultural heritage and high-value applications, some companies are using digital analysis and automated production to replicate traditional handicraft techniques, including intangible cultural heritage crafts. This approach lowers production costs while preserving and promoting cultural heritage, fostering the development of Chinese cultural brands on a global scale. Moreover, as the concept of healthy living gains traction, the textile and garment industry is collaborating with the sports and medical sectors to develop smart textiles. These fabrics, embedded with sensors, can monitor vital signs such as blood pressure and heart rate, offering real-time health data. By enhancing both the practicality and health benefits of clothing, these innovations position healthcare-integrated textiles as a major area for technological breakthroughs and market expansion. With continuous advancements, the textile and garment industry is well-positioned to meet changing consumer needs and drive sustainable growth.

2.1.3 Green Transition.

Technological advancements play a crucial role in reducing pollution and promoting the green and sustainable development of the textile and garment industry. There are three primary ways in which technological innovation drives this transformation: energy conservation and emission reduction through cleaner production technologies, recycling of materials to create circular production systems, and the research and development of biodegradable biological materials for non-recyclable components. These approaches collectively contribute to minimizing the industry's environmental footprint while enhancing resource efficiency. The textile and garment industry has long been associated with high levels of pollution, particularly in processes such as printing and dyeing. In recent years, many enterprises have significantly increased research and development (R&D) investments to mitigate energy consumption and pollutant emissions. By targeting heavily polluting stages, companies are introducing low-energy, low-emission technologies that promote cleaner production. For instance, innovations

in waterless and low-water dyeing technologies, such as dope dyeing, ensure high dyeing uniformity and vibrant coloring effects while streamlining the production process and minimizing energy use. Similarly, corona discharge technology offers notable advantages, including superior cleanliness, reduced pollution, high efficiency, and uniform treatment. This technology not only enhances dyeing effects and color retention but also achieves substantial fuel savings and reduces wastewater emissions, contributing to low-carbon production [8]. Furthermore, to establish a circular economy within the industry, companies are increasingly incorporating recycling processes into the industrial chain. Establishing dedicated systems for the collection and recycling of waste textiles allows for the regeneration of yarns, fabrics, and chemical fibers. Through advanced re-synthesis technologies, discarded materials can be converted into high-quality products, reducing reliance on virgin resources and lowering the industry's overall carbon footprint. By closing the material loop, the textile and garment sector can significantly improve resource utilization efficiency and move towards a more sustainable and resilient development model. Additionally, cross-industry collaboration and policy support will further accelerate the adoption of these green technologies. Governments can play a key role by introducing incentives for enterprises that invest in eco-friendly innovations and implementing stricter environmental regulations to encourage cleaner production. With continuous technological progress and enhanced cooperation between enterprises, research institutions, and policymakers, the textile and garment industry can achieve long-term sustainable growth while contributing to global environmental goals.

2.2 Artificial Intelligence

2.2.1 Productivity Improvement.

AI's advanced analytical and inspection capabilities are significantly enhancing production efficiency in the textile and apparel industry. Unlike traditional AI, the latest AI models offer superior generation abilities, generalization capabilities, and natural interaction features, making various tasks faster and more accurate. When integrated into key production stages, AI facilitates automated and efficient production, driving innovation and accelerating the industry's development. During the production process, AI uses deep learning for data analysis, supported by sensors, data monitoring tools, and other smart devices. It captures real-time information across production and management activities, comparing images and data with standard parameters. This enables AI to provide precise and reliable inspections and analyses. Additionally, it ensures optimal equipment operation, monitors for malfunctions, identifies defective products, manages production capacity, and adjusts machine performance to improve overall production efficiency [9]. AI also enhances workflow transparency by breaking down information silos between departments. Traditionally, data was fragmented and difficult to interpret, leading to inefficiencies. With AI, upstream and downstream information flows become seamless and transparent, improving coordination and ensuring smoother operations [10]. Moreover, the textile and apparel industry often faces challenges from rapidly changing consumer preferences. AI-powered models can analyze vast amounts of data on seasonal trends, material performance, and fashion patterns to predict future

market demands. This predictive insight allows companies to make informed production decisions, accelerate supply chain integration, optimize industrial layouts, and enhance response times. Ultimately, AI empowers the industry to operate more efficiently, reduce waste, and stay competitive in a fast-paced market.

2.2.2 Intelligent Product Design.

Artificial Intelligence is accelerating product design and fostering innovation in industrial culture. With the rapid advancement of AI technologies in recent years, tools like deep learning, associative thinking, and computational simulations have become essential for enhancing design processes. As Industry 4.0 drives the demand for personalized, customized, and high-end products, AI has emerged as a powerful assistant in the design and development phase of the textile and apparel industry. Traditionally, designers must possess a thorough understanding of a wide range of fabrics, including their properties and visual effects. However, as new materials continue to emerge, testing the combinations of different fabrics and evaluating their actual performance can be both time-consuming and costly. AI, after gaining deep insights into fabric characteristics, uses digital analysis to simulate the physical properties of materials at the molecular level. By integrating with technologies like 3D body scanning and virtual reality (VR), AI facilitates virtual product design, sample previews, and fitting adjustments. This not only enhances the visual appeal and wearing experience for consumers but also enables designers to compare different fabric combinations efficiently [11]. Consequently, AI reduces the time and material expenses associated with physical sample adjustments. However, the role of AI in design should be approached with a balanced perspective. While AI offers valuable artistic inspiration and suggestions for design refinement, current AI-generated designs often face issues of homogeneity and lack the emotional and cultural sensitivity that human designers bring. Additionally, concerns around design ethics and fairness remain significant [12]. Thus, the responsible and judicious use of AI in design processes will be a critical focus for the textile and apparel industry. By combining AI's efficiency with human creativity and emotional insight, the industry can achieve greater innovation while maintaining the authenticity and individuality of its designs.

2.3 High-Quality Workers

2.3.1 Optimization of Human Capital Structure.

Transforming low-end production roles into high-skilled positions is essential for optimizing industrial production and driving long-term growth. High-quality talent serves as a key force in innovation and development, as these professionals leverage advanced technologies to accelerate the intelligent and digital transformation of production processes. From research and development (R&D) to manufacturing, marketing, and customer engagement, skilled personnel play a vital role in advancing new productivity and fostering economic progress [13]. Currently, a significant portion of the labor force in China's textile and garment industry occupies basic manufacturing roles, which incur substantial labor costs without contributing to the rapid adoption of

new materials and innovative processes. To improve operational efficiency, the labor structure requires strategic optimization. With the expansion of higher education opportunities nationwide, the workforce is gradually shifting from traditional production tasks to roles in management, R&D, and technology application. Simultaneously, advancements in automation and intelligent manufacturing are reducing the need for manual labor. While machines lower labor expenses, they also generate demand for specialized jobs in machine operation, maintenance, and management, effectively restructuring the industry's employment landscape. Moreover, as companies adopt intelligent technologies, the need for high-end, interdisciplinary talent grows. Enterprises must recruit professionals with expertise not only in engineering and technology but also in understanding industry-specific challenges and consumer preferences. For instance, in material development, experts must balance performance enhancement with consumer desires for aesthetics and comfort. Additionally, collaboration between humans and AI systems in a human-machine partnership model requires professionals who can bridge technological innovation with market insights [14]. To support this transformation, enterprises should actively invest in talent cultivation through targeted training programs and partnerships with academic institutions. Collaborative initiatives, such as industry-specific training programs, internships, and research collaborations, can accelerate the development of a highly skilled workforce. Additionally, companies should implement attractive career growth opportunities and competitive compensation packages to retain top talent. By empowering high-tech professionals to lead in R&D, market adaptation, and brand development, enterprises can enhance their competitive edge in the global textile and garment industry. This shift toward a more skilled workforce, supported by technological advancements and continuous learning, is a fundamental step toward sustainable growth, industry resilience, and continued innovation.

2.3.2 Innovative Talent Training.

Digital and intelligent technologies play a pivotal role in cultivating high-quality talent in specialized fields, which is essential for the textile and apparel industry's high-quality development. Unlike traditional academic training, talent development in the digital intelligence era demands individuals with strong technical proficiency, innovative thinking, leadership skills, and a well-rounded professional background [15]. With the increasing transparency and accessibility of industry and technology-related information, knowledge exchange has flourished, creating a fertile environment for education and talent cultivation. By integrating cutting-edge technologies into education and training, institutions can foster innovative, cross-disciplinary talents equipped to tackle industry challenges. Encouraging collaboration and knowledge sharing across different fields promotes the development of forward-thinking professionals. In the textile and apparel industry, future talent must possess not only an in-depth understanding of textile technology and design innovation but also digital expertise. This includes proficiency in intelligent manufacturing systems, AI-driven design platforms, and sustainable production techniques. Such comprehensive training enables professionals to identify industry pain points, analyze complex data, and apply practical solutions to drive industry progress. Industry-academia collaboration is crucial in achieving these goals.

Companies and universities should work together to design real-world training programs that combine theoretical knowledge with hands-on experience. By immersing students in actual production environments through internships, cooperative research projects, and on-site training, they can gain practical insights and refine their problem-solving abilities. Additionally, establishing joint laboratories, innovation hubs, and mentorship programs will further strengthen the talent pipeline. This approach not only enhances the practical skills of emerging talent but also fosters a deeper understanding of cross-disciplinary innovation. Furthermore, encouraging professionals to engage in continuous learning and stay updated on technological advancements ensures long-term industry resilience. Ultimately, nurturing a new generation of high-quality talent equipped with both technical and strategic capabilities will provide the textile and apparel industry with the innovative energy needed for its transformation and sustainable growth.

Based on the above research, we can obtain a mechanism model for empowering the high-quality development of the textile and garment industry with new quality productivity(Figure 1).

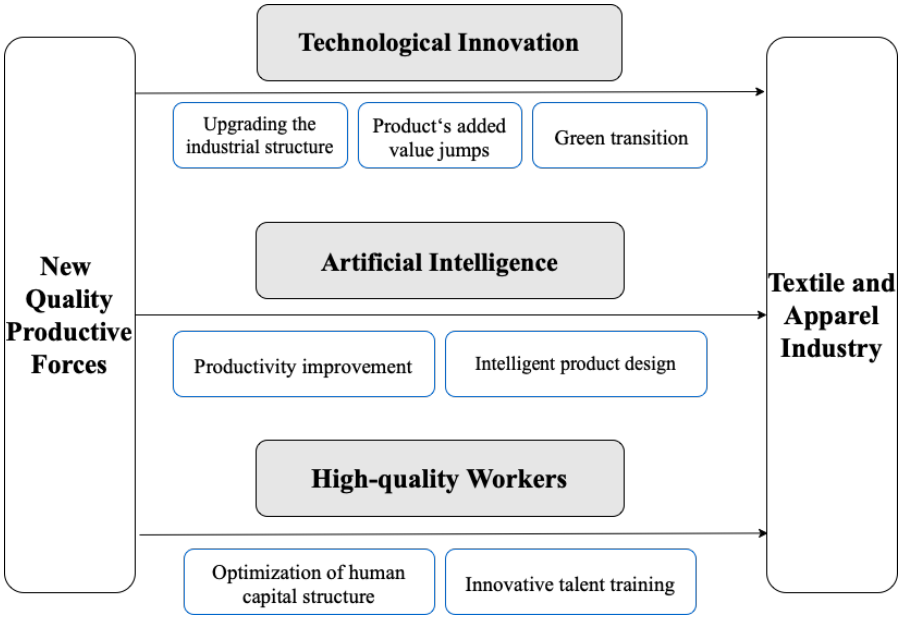

Fig. 1. Mechanism Model of The Reasearch Conclusion

3 Conclusions and Recommendations

3.1 Research Conclusions

This article mainly discusses the mechanism of action of new-quality productivity in promoting the high-quality development of the textile and garment industry. Specifically, there are three paths as follows: First, in terms of technological innovation, with the help of digitalized and automated equipment, accelerate the upgrading of the entire industrial structure, develop new materials, and increase the added value of products. At the same time, promote green production technologies and energy conservation and emission reduction. Second, the rapid development of artificial intelligence with the help of big data and sensing technologies to achieve a comprehensive improvement in production efficiency, in addition to deep learning and data analytics capabilities to achieve intelligent design, improve efficiency and reduce costs. Third, industrial transformation has put forward higher requirements for talents, from traditional low-end production to high-end innovative talents, through the help of digital intelligence and intelligent facilities, to promote talent training, improve the technical literacy of industry practitioners and innovation ability. Overall, with the help of new productivity, the innovation and application of intelligent technology and the training of high-quality talents together form an important support for the transformation and upgrading of the textile and clothing industries, opening up broader prospects for the future development of the industry.

3.2 Management Inspiration

With technological innovation as the central driving force, new-quality productivity is fundamentally reshaping the development model of the textile and garment industry. It is accelerating the industry's transformation and upgrade toward intelligence, efficiency, sustainability, and high added value. Based on the findings of this paper, the following insights and recommendations are proposed:

(1) To drive the high-quality development of the textile and garment industry, it is essential for enterprises to recognize the core role of new-quality productivity. As key players in the industry, companies must understand the critical importance of technological innovation and industrial upgrading as fundamental paths to enhance competitiveness and achieve sustainable growth. Government policies play a vital role in providing direction and support. Authorities should ensure that the strategic focus of basic research aligns with the core goals of developing new-quality productivity. By offering targeted support and effectively allocating resources, governments can accelerate industry-wide innovation. First, the government should establish national key laboratories within enterprises and encourage participation in major scientific and technological research projects. This approach fosters technological advancements and accelerates the application of research breakthroughs in practical production. Second, Special funding programs and tax breaks should be offered to enterprises investing in basic research. This financial support can alleviate innovation costs, enabling compa-

nies to pursue technological breakthroughs and gain a competitive edge. Third, promoting best practices and success stories from pioneering enterprises can encourage other companies to adopt a similar emphasis on innovation. Demonstrating the tangible benefits of combining basic research with technological development can strengthen industry-wide confidence in innovation-led growth. What's more, Governments should encourage partnerships between enterprises, research institutions, and universities. Facilitating joint R&D programs and establishing platforms for knowledge exchange will further enhance the industry's technological capabilities. By aligning policy initiatives with the advancement of new-quality productivity, enterprises will be empowered to drive innovation, enhance global competitiveness, and contribute to the sustainable development of the textile and garment industry.

(2) To achieve the high-quality development goals of the textile and garment industry, enterprises must proactively strengthen their core competitiveness. Business leaders should adopt strategic thinking that focuses on the industry's future growth and emerging technological advancements. By closely monitoring industry trends and identifying opportunities where cutting-edge technologies intersect with market demands, enterprises can define their R&D priorities to drive innovation. Enterprises should increase financial and resource support for their research teams. Learning from domestic and international best practices can accelerate the adaptation and localization of innovative technologies. A market-oriented approach to technological innovation will ensure that R&D efforts align with both business goals and market needs. Besides, building a strong talent pool is essential for driving innovation. Enterprises should implement competitive compensation and incentive policies such as equity incentives, performance bonuses, and research grants. These measures will not only attract skilled professionals but also reduce the loss of core technical personnel. Meanwhile, establishing a comprehensive training system is key to nurturing a highly skilled workforce. Companies should allocate funds for specialized skill enhancement programs and conduct regular internal and external training sessions. Encouraging participation in international exchanges and cross-industry collaboration will further enhance employees' technical capabilities and innovative thinking. By pursuing these initiatives, enterprises can enhance their competitive edge, drive sustainable growth, and contribute to the broader transformation of the textile and garment industry.

(3) To accelerate the industrial application of new quality productivity and promote technological innovation, universities and research institutions should actively engage in partnerships with enterprises. This collaboration serves as a bridge between academic research and industry needs, fostering mutual growth. As the textile and garment industry undergoes transformation, the demand for skilled professionals is increasing. Universities should align their educational programs with industry advancements by incorporating cutting-edge technologies and industrial trends into their curricula. Emphasizing practical application and innovation will ensure graduates are equipped with the skills needed to contribute effectively to industrial progress. Enterprises, with their deep understanding of industry challenges and technological bottlenecks, should work closely with research institutions. Establishing long-term collaboration mechanisms through initiatives such as joint laboratories and talent training bases will facilitate the transfer of knowledge and innovation. Additionally, universities can organize programs

that allow students to directly participate in real-world R&D projects and technology commercialization efforts, bridging the gap between theory and practice. Collaborative efforts can resolve the issue of skill mismatches in the labor market [16]. By maintaining regular dialogue and joint research initiatives, both parties can ensure that academic training aligns with industry needs, fostering the development of innovative solutions. Industry-academia partnerships not only drive the practical application of emerging technologies but also push research institutions to pursue targeted and impactful research. This dynamic interaction accelerates technological breakthroughs, enhances enterprise competitiveness, and promotes the high-quality development of the textile and garment industry. Through continuous collaboration, universities and enterprises can create a synergistic environment where research supports industrial progress and industries provide valuable insights to guide future research endeavors.

4 Conclusion

This paper identifies three key pathways—technological innovation, artificial intelligence application, and the cultivation of high-quality talent—through which new quality productive forces fundamentally reshape industrial structures, transform production dynamics, and redefine competitive advantages. This study not only fills a research gap in understanding the role and mechanisms of new quality productive forces in traditional manufacturing sectors, but also offers theoretical foundations and practical insights for policymakers, business leaders, and educational institutions. Looking ahead, the textile and apparel industry must continue to harness the power of new quality productive forces, increasing investment in R&D and accelerating its digital transformation. At the same time, a stronger synergy between industry, academia, and research institutions should be fostered to build a sustainable innovation ecosystem. With a growing emphasis on green development and cultural value creation, the industry can enhance its competitiveness across the entire value chain. As the global industrial landscape continues to evolve, only by proactively embracing change and aligning with this new wave of development can China’s textile and apparel sector transition from being large in scale to being truly strong and globally influential.

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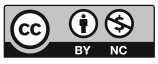
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