

Research on Technological Innovation System of China's Textile Industry Based on Process Control

Li Sun

Zhejiang Fashion Institute of Technology, Ningbo, Zhejiang 315211, China

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Abstract: Textile industry is not only a traditional pillar industry in China, but also the third largest export industry after electromechanical and tourism industries. Global textile trade liberalization will bring new opportunities for China's textile industry to make better use of international and domestic resources and vigorously expand domestic and foreign markets. However, objectively, the impact faced by the textile industry is two-way. At present, the lack of technological innovation ability and the backwardness of equipment and technology have become the main problems restricting the sustainable development of China's textile industry. In order to give further play to the competitive advantages of China's textile industry, correctly establish the position of China's textile industry in Asia and the world's textile industry, reasonably allocate various resources to form a competitive nuclear force, and promote the sustainable development of China's textile industry, we must change the current situation of winning by quantity and pay attention to the technological innovation of China's textile industry, especially the establishment and effective operation of the technological innovation system. This paper makes a comprehensive research and Analysis on the main elements of the technological innovation system of China's textile industry.

1. Introduction

With the continuous development of the textile industry, the application of advanced production equipment has greatly improved the productivity of textile enterprises. However, for small and medium-sized enterprises, due to the low degree of informatization and backward production management mode, it leads to problems such as high labor cost, low efficiency and lagging information sharing, which seriously restricts the development of enterprises [1]. At present, the development of information management system is becoming more and more mature. There are many mature ERP products in the current market, but most of them are based on standard management module design, which is difficult to apply to the production process and management mechanism of small and medium-sized textile enterprises dominated by order production [2]. As an important resource for economic development, textile technology is playing a more prominent role in many industries than capital and labor. Technological innovation has become an important way to enhance the international competitiveness of industries [3]. Textile industry is the first industry in line with international standards and the main industry of export earning foreign exchange. It is an important pillar industry of China's national economy [4]. The system customized for specific enterprises has poor reconstruction performance and high development cost. In addition, most production management systems have poor ease of use and cumbersome operation, resulting in high training costs [5].

Under the premise of huge stock of traditional equipment, the equipment cannot be updated in a large scale; Maintaining the status quo will lead to insufficient competitiveness. Only by completing the automation technology transformation of the existing equipment can we effectively improve the competitiveness of China's textile industry [6]. This is the reason why the demand for industrial automation technology in China's textile manufacturing industry continues to grow under the overall decline of China's economic growth. At present, the increasing production costs of textile enterprises, especially the increasing labor costs, have become increasingly prominent. Enterprises often look at the automation and informatization of the textile industry from the perspective of promoting industrial upgrading based on cost pressure [7]. Fully integrating into globalization is a

new perspective for technological innovation of China's textile industry, undertaking international industrial transfer, a new breakthrough in technological innovation of China's textile industry, seeking grafting with multinational corporations, a new platform for technological innovation of China's textile industry, and increasing the introduction of advanced intelligence, It is a new model of technological innovation in China's textile industry. The construction of a characteristic textile industry technological innovation system is the guarantee for the effective implementation of textile technological innovation [8]. On the one hand, China's textile industry will continue to give full play to the comparative advantage of abundant labor force. On the other hand, it needs to constantly rely on technological innovation to promote industrial upgrading [9]. All this depends on the efforts of the textile industry to improve its competitiveness and the ability of technological innovation [10].

2. Textile production process control

2.1. Architecture of Textile Production Management System

The architecture of textile production management system is shown in Figure 1:

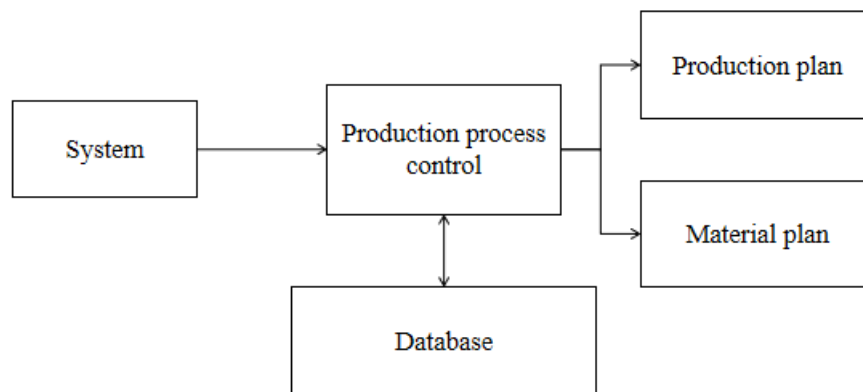


Figure 1 Design architecture of textile management system for process control

It mainly includes production process control module, production material planning module and database system. The production process control is the core, which realizes the intellectualization of production planning and material preparation by calling the production planning and material planning module. The production process control module controls the whole production process, which is the key to the design of production management system. The production process is driven by customers' orders. The advancement of the process is accompanied by the generation of tasks. Task driven employees interact with the production process. The interactive information is recorded in the order. The order information exists in the whole production process and is saved in the database. The interactive process completes the execution of tasks and the completion of tasks promotes the process. The interaction between system users and production management system is divided into task driven and non task driven. Task driven interaction refers to the work generated by the process and needs to be completed by users. It is related to the promotion of the whole production process; Non task driven interactions are relatively independent and process independent operations. The production planning module determines the production plan of the order. Its essence is a scheduling problem, that is, allocate certain equipment resources to the order in a time period to optimize the scheduling performance index. The material planning module determines the raw materials required for order production according to the production plan and material inventory, and formulates a reasonable purchase plan. There are three modes of system reconfiguration: parameter setting, reuse and mixed mode. The production process control module adopts the mixed mode of parameter setting and module reuse; The production material planning module adopts the parameter setting mode.

2.2. Textile production management design

The core idea of textile technology is node modularization, order abstraction and business registration mechanism. The production process is abstracted as an orderly combination of modular nodes, which represent a step of the process; At the same time, the information related to the order is abstracted into the list of order elements; Process advancement is the flow of abstract orders between directed nodes. The business registration mechanism injects the specific business content into the system framework, and the process management engine and application service engine call the system framework to realize the system functions. A node is a unit in a process that handles a single transaction. Node modularization refers to the process of encapsulating the node definition, interface and business logic into module units that can completely describe the node and its transactions and are loosely coupled with the system framework according to the business requirements of the node. The modular node is composed of node definition, interface and business logic. The node definition specifies the location of the node in the process and the transaction information of the node; Interface provides user interaction interface; Business logic handles specific node transactions. Compared with the traditional function modular design method, the significance of node modularization is to increase the independence of nodes and realize the loose coupling of specific node business, process management and business framework. Through the dynamic loading and free combination of modular nodes, the flexible change of process is realized without affecting the system framework, so as to improve the reconfiguration performance of process management module. Because the production processes of textile enterprises are similar, some modular nodes can be reused as general nodes. On this basis, the establishment of a textile industry process node library will greatly improve the reusability of production process control modules.

3. China's textile industry technology

3.1. Progress of textile industry technology

As a traditional pillar industry, textile industry has always created extraordinary achievements. Both GDP and quality are continuously improving. It occupies an important position in national and local economic development and plays an obvious role in driving the economy. The basic situation of scientific research institutions in the technological innovation system of China's textile industry includes human resource distribution, scientific research fund-raising and expenditure, scientific and technological output, etc. Over the past decade, China's textile industry has made great achievements in the construction of technological innovation system. As shown in Figure 2, it is the composition diagram of the supporting environment of the technological innovation system of the textile industry:

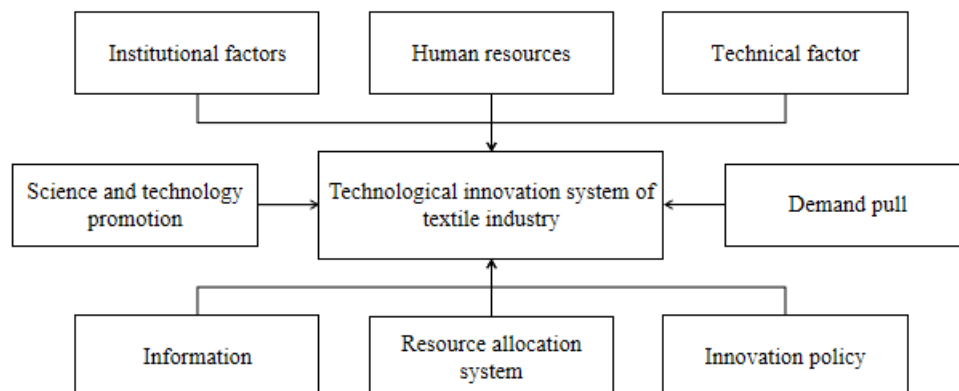


Figure 2 Composition of supporting environment for technological innovation system of textile industry

But on the whole, as the main body of innovation, Chinese textile enterprises lack endogenous technological innovation power, low scientific and technological investment and lack of funds; The

R & D work of many universities and institutes has not really realized the transformation of taking enterprises as the main body and demand driven. The government plays a leading role in the construction of innovation system, generally provides a good environmental guarantee for technological innovation of textile industry, and provides strategic direction for major industrial technological innovation, that is, two aspects: one is the role of culture on innovation; The second is how to create a cultural atmosphere conducive to innovation. First, cultivate spirit. Secondly, cultivate scientific and technological literacy; Finally, establish a social environment that attaches importance to textile technology, respects talents, encourages creation and respects innovation. The state has maintained a certain proportion of investment in the textile industry, which has strongly promoted the development of technological innovation activities. However, the support is insufficient, especially affecting the development of original innovation activities and the R & D activities of key technologies and common technologies., Improve innovation efficiency and concentrate human, financial and material resources to do major events; Continuously improve and build an innovative service system. Therefore, the government's support and regulation of technological innovation can realize the coordination of various innovation elements and promote the improvement of innovation efficiency.

3.2. Building textile industry technology

In order to accelerate the transformation of China from a world textile power to a textile power, the state clearly pointed out that the textile industry should follow the development of international new technology, transform traditional industries with high and new technology, and accelerate technological progress and industrial upgrading. At the enterprise level, the technological innovation mode of textile enterprises should be positioned in: focusing on imitation innovation, and actively implementing independent innovation strategy and virtual innovation. The inevitable choice for China to move from a large textile country to a powerful textile country is to pay attention to the research and development of basic science and high-tech and implement the strategy of independent innovation. Independent innovation can obtain and determine the exclusive competitive advantage of intellectual property rights, which is conducive to accumulating "intellectual capital" and obtaining "huge profits from knowledge". For the vast majority of small and medium-sized textile enterprises in China, it is difficult to complete a technological innovation due to the constraints of their own economic strength, R & D strength and other factors, so they can complete the development of products or technologies with the help of external forces. At present, information technology, new materials and biotechnology have penetrated into the textile industry. In addition to reducing production costs and improving production efficiency, the research and development of textile technology mainly focuses on textile related technologies in the fields of environmental protection, human health care, energy development, information communication and so on. As a high-tech textile enterprise, in view of the uncertainty and time lag of high-tech, it is very necessary for independent innovation to obtain the leading position of market, product and technology, and lay the foundation for the final leading position.

4. Conclusions

China's textile industry has gradually formed a technological innovation system with enterprises as the main body. The competitiveness of textile industry is mainly reflected in the cost of raw materials and labor. However, with the change of international market pattern and the opening-up policies implemented by surrounding countries, China's existing comparative advantage is gradually weakening. With the advent of the era of trade protection in the form of low volume, it is bound to win in the form of trade restriction. The textile production management system based on process control has good reconfigurability, realizes the loose coupling between the system framework and business content, and is committed to building a reusable production process node library and production order element library for the textile industry. Improving the innovation ability of textile industry is a systematic project, which should be promoted by science and technology and effective mechanism. The reconfiguration performance of the system greatly reduces the difficulty of system

improvement and transplation; The friendly user interface reduces the cost of employee training and improves work efficiency. Scientific research institutions led by enterprises have become an important part of the technological innovation system of China's textile industry. They are not only the subject of knowledge innovation in the technological innovation system, but also the behavioral subject of technological innovation. The government continues to strengthen and improve the macro management function to make the construction of the technological innovation system more perfect.

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