

Research on the Construction of Sci-tech Innovation Platform System for Textile Enterprises—Taking Textile Industry in Shaoxing as an Example

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Abstract: *The sci-tech enterprises are the driving force for the development of regional industries. As a pillar industry in Shaoxing, the textile has a large industrial cluster and a complete industrial chain. To further enhance its competitive advantages, the enterprises shall play an active part in establishing the sci-tech innovation platforms, improving their independent innovation capabilities and core competitiveness, and ensuring the sustainable development of the enterprise with the promotion of the government. According to the field visit and the analysis on the survey data of textile enterprises in Shaoxing, this paper focuses on selecting the representative textile enterprises, and conducts the further analysis and research on the sci-tech innovation platform of enterprise in the way of integrating point and sphere, which helps to provide the reference for the textile enterprises and the enterprises in other industry for establishing the sci-tech innovation platforms.*

Keywords: *Sci-tech innovation platform; Textile enterprises; System construction*

1. Introduction

As the development of society and economics in China is taking the significant transformation, the sci-tech innovation has become more and more important. The rational allocation and utilization of knowledge, talent and sci-tech resources are increasingly becoming the key factors in the national development. In the Key Points for Constructing Zhejiang as a Powerful Sci-tech Province in 2022, it definitely proposes to focus on cultivating the major innovation platforms and strives to construct the top strategic sci-tech forces. The construction of innovation platforms helps to promote the efficient allocation and comprehensive utilization of sci-tech resources, improve the conditions for sci-tech innovation, and enhance the independent innovation capabilities. The sci-tech innovation platform is proposed in this context, with its main elements of government, higher education institutions, research institutes, production enterprises, financial institutions, and intermediary institutions. It aims at greatly improving the innovation capabilities of the universities and research institutes, as well as the abilities to solve the significant sci-tech problems in national economic construction, enhance the competitive strength to undertake major national tasks, carry out high-level international cooperation through the construction of the sci-tech innovation platform and promote the optimization and intersection of disciplines, which helps to realize the significant sci-tech achievements and world-class disciplines. And it plays an important role in the construction of the national innovation system, and promotes the industrialization of scientific research achievements. The enterprises are not only the core innovation force in the sci-tech innovation platform, but also the key to the success of the sci-tech innovation platform. The sci-tech innovation platform of the enterprise is a place which gathers the sci-tech resources, talents, equipment, and high-tech research and development. It is not only an innovation environment for promoting the development of the enterprise, but also an effective organizational and spatial form for gathering the innovation resources and attracting innovative talents of the enterprise^[1]. The form of sci-tech innovation platform with enterprise as the main body includes the enterprise key laboratory, enterprise engineering technology center, enterprise technology research and development center, academician expert workstation and doctor innovation station. Shaoxing has a huge cluster in the textile industry, which has formed a complete industrial chain covering upstream of PTA, polyester and spinning, midstream of weaving, dyeing and finishing, and downstream of clothing, clothes, home textiles and industrial textiles. The perfect professional textile market and public service platform help it become the most complete and competitive cluster in the textile industry in the industrial chain of

China. According to the data provided by the government, in 2020, there were nearly 70,000 textile enterprises and household industrial units in the city, including 1,784 textile enterprises with large scale. Driven by the continuous development of modern textile technology and the transformation and upgrading of the textile industry, the enterprises play an active part in establishing the sci-tech innovation platforms, improving their independent innovation capabilities and core competitiveness, and promoting the sustainable development. Although Shaoxing has gained great achievements, some enterprises that have thrown a lot of human, material and financial resources into the sci-tech innovation platform failed to achieve the results as expected. That may be caused by the inappropriate management mode, or unfeasible operation mechanism. According to the field visit and analysis on the survey data of textile enterprises in Shaoxing, this study conducted the further analysis and research on the sci-tech innovation platform system of the enterprise from the organizational structure, operation mode and effectiveness evaluation, as well as analyzing the problems, accumulating experience and putting forward suggestions, which will provide reference for the textile enterprises and the enterprises in other industry to establish the sci-tech innovation platforms.

2. Current Situation of Textile Industry in Shaoxing

2.1 Development Status of Textile Industry in Shaoxing

There are different scales of textile industry in Shaoxing, which can be divided into four parts: chemical fiber, weaving, printing and dyeing, clothing and clothes. With the rise of chemical fiber weaving industry, the township weaving enterprises, mainly in Keqiao District, develop rapidly, and the fabrics produced have sold well in China, which has led to the rapid development of chemical fiber, printing and dyeing, clothing, home textile, textile machinery and other chains of textile industry in Shaoxing, which allows Shaoxing to become the largest textile production base in China [2]. In 2020, the cost on research and development (R&D) in the textile industry is 5.109 billion yuan, with a year-on-year increase of 16.7%, and the R&D investment intensity reached 3.25%. With the continuous increase in innovation ability, the output value of new products of the textile industry in 2020 was up to 57.257 billion yuan, accounting for 30.28% of the total output value. There are three provincial-level innovative service complexes for textile industries, which include Keqiao Modern Textile Industry, China International Hosiery Industry and Shengzhou Silk and Tie Industry. There are two provincial-level characteristic towns, including Zhuji Datang Socks Industry Town and Shengzhou Lingshang Town. The creative design base of Keqiao Textile Industry has been selected as one of the first pilot parks of textile and garment creative design in China, while Zhejiang Advanced Printing and Dyeing Manufacturing Innovation Center entered into the cultivation list of provincial manufacturing innovation centers.

2.2 Overview of Innovation Platform for Textile Enterprises in Shaoxing

As of June 2022, there are about 217 textile high-tech enterprises and 21 academician (expert) workstations throughout the city. For example, the high-tech textile enterprises of Zhejiang Guxiandao Incorporated Company and Zhejiang Furun Textile Co., Ltd. have established the innovative platforms of provincial-level research and development centers and academician expert workstations, which greatly supports the research and development on the new material, new process research, new technology promotion, and the application of new equipment.

3. Analysis on the Construction of Sci-tech Innovation Platform System for Textile Enterprises

3.1 Organizational Structure of Sci-tech Innovation Platform System for Textile Enterprises

A complete and independent sci-tech innovation platform for textile enterprises is in need of director, manager of the department, supervision consultants and technicians. The direct shall be responsible for the management work, engage in the strategic planning of development of enterprise, formulating the plans, strategies and goals, and promoting their achievement; The manager of the department shall be responsible for the routine arrangement, work progress and member assessment of each department; Technicians shall be responsible for carrying out different tasks and timely settling the technical problems; Supervision consultants shall be engaged in the development and implementation of the best production plan in their professional field, offer guidance to the development of different process quality indicators, determine different operating parameters, prepare

the operating procedures and set up the work types. The organizational structure of the technology research and development center in the textile enterprise consists of the director of the research and development center, the manager of the research and development department, the sample engineer, the engineer of research and development, and the manager of the technical department. The organizational structure of key laboratories in the textile enterprises consists of laboratory director, supervisor, technical supervisor and quality supervisor. The organizational structure of the technical engineering center in the textile enterprise consists of the director of the technical engineering center, the manager of the technical department, the manager of the engineering department, and the group of supervisory experts. The academician expert workstation (team of academician experts) and the doctoral innovation station (3 or more doctoral teams) can be compared to the expert advisory team of the enterprise and work for the enterprise together with other platforms.

3.2 Operation Mode of Sci-tech Innovation Platform System for Textile Enterprises

On the basis of high positioning, high standards and high requirements, the establishment of a sci-tech innovation platform for the textile enterprises aims to construct them into a sci-tech innovation brand project. The operation mode of sci-tech innovation platforms plays a significant role in ensuring the effectiveness to deepen the specific work of promoting sci-tech innovation platforms, strengthen the cooperation with cooperating units, provide powerful guarantees for the construction of different platforms, and promote the formation and improvement of enterprise core capabilities. As shown in Figure 1, the platform demands the requirements of collection according to the demands of society and market and applies for the projects based on the current knowledge and technology. Upon approval, it conducts preliminary test, pilot test and production and finally puts them into the market. The funds mainly rely on the policy support from government and the benefits of external services provided by enterprises. The government has the authority in supervising the funds. As the entrusted unit, the enterprises shall invest the equipment and personnel and ensure the normal operation of capital flow [3,4].

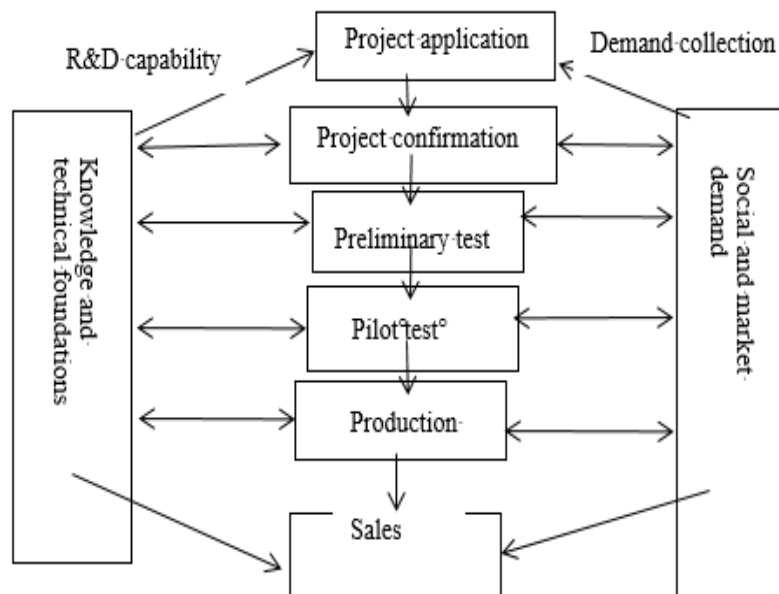


Figure 1: Operation Mode of Sci-tech Innovation Platform System for Textile Enterprises

3.3 Effectiveness Evaluation of Sci-tech Innovation Platform for Textile Enterprises

As shown in Table 1, the effectiveness of innovation platforms can be evaluated from multiple perspectives in different periods. In the initial stage of the construction of the platform, the focus is to establish the demands and projects, rely on the conditions and foundation of the enterprise, implement the plans and formulate the plans. Making full use of the leading role of sci-tech innovation platforms helps to gather talents, technology and other resources, as well as comprehensively promoting the development of textile enterprises. And the evaluations can be made from the proportion of R&D personnel, the proportion of R&D investment, and the number of projects obtained at all levels^[5].

Table 1: Effectiveness Evaluation of Sci-tech Innovation Platform for Enterprises

Construction Phase of Innovation Platform	Evaluation Project
Initial stage of construction	Proportion of R&D personnel
	Proportion of R&D investment in the initial stage of construction
	Honors
Middle stage of construction	Number of production problems solved
	Number of project applications and acceptances
	Number of mid-term patents for construction
	Number of papers
Final stage of construction	Number of industry-university-research cooperation agreements
	Number of achievements converted
	Number of sci-tech reports held and published in the period of final construction
	Number of talent cultivation
	Establish the training base
	Number of suggestions from government
	Number of external services provided

After completing the construction phase of innovation platform, the effectiveness can be evaluated from the following aspects:

First of all, whether to substantively promote the development of production and textile enterprises. Each innovation platform focuses on the bottlenecks and hot issues in the development of enterprise, relying on the intellectual resources of sci-tech innovation platforms to make breakthrough into the key technical difficulties in the actual production. Quantitative evaluation shall be applied to solving the number of production problems, patents, papers and project applications and acceptances.

Secondly, whether to realize the integration of industry, academia, research and application and sci-tech innovation. It shall strengthen the cooperation with different construction units like universities and research institutes, so as to promote the transformation of sci-tech achievements. It shall also follow the trend of technology in global textile industry, observe the cutting-edge technology achievements of textile, and pursue the leading levels in the industry. Quantitative evaluation can be applied to the number of cooperation agreements and contracts, the converted achievements and the sci-tech reports delivered and published.

Thirdly, whether to obtain the cultivation of sci-tech talents and the radiation effect of the industry. It shall cultivate and develop more professional talents, carry out the sci-tech innovation policies, keep improving and forming a service network, and radiate the relevant enterprises. Quantitative evaluation can be applied to the number of talent cultivation, the establishment of training bases, the number of suggestions from government and the number of services provided.

4. Problems in the Development of Sci-tech Innovation Platform for Textile Enterprises and the Improvement Path in Shaoxing

4.1 Problems in the construction and operation of enterprise technology innovation platforms

Firstly, it is short of the top-level design in textile enterprises, and the person in charge fails to attach importance to the sci-tech innovation platforms, which causes it difficult to complete the tasks.

Secondly, the platform management system and assessment mechanism are not perfect. As the enterprise innovation platforms will not be able to directly bring any economic benefits, most assessment mechanisms of the platform fail to effectively present the achievements of sci-tech personnel, which results in the great talent loss on the platform.

Thirdly, the research and development capabilities of textile enterprises are not great enough, and their operation modes are not perfect. There are few dedicated R&D departments and independent operation modes in many small and medium-sized enterprises. Therefore, R&D personnel not only involve in the market business but also undertake the production tasks of the enterprise. Although some

large enterprises have established the complete platform, yet they are constrained by different factors and find it difficult to bring significant benefits.

4.2 Improvement Measures for the Construction and Operation of Enterprise Science and Technology Innovation Platform

First of all, the enterprises shall understand and value the importance of sci-tech innovation and the necessity of platform construction. It is necessary to gather the strengths of enterprises from all the departments to jointly promote the platform construction. Meanwhile, it is necessary to clarify the construction goals, tasks and plans of each platform, and carry out the construction and promotion in an organized and planned manner.

Secondly, it shall improve the operational mechanism of the scientific research innovation platform. It shall strengthen the connection among the technology, production and market, and comprehensively connect the entire process of scientific research innovation, achievement transformation and technology application.

Thirdly, it shall strengthen the connections with the government and science and technology departments, as well as creating a sci-tech atmosphere for the enterprises. It shall also strengthen the communication and exchange with the world, gain the cutting-edge resources and information, set up the communication groups, conduct the regular sharing and discussion on technology, and promote the transformation of scientific research achievements according to the research directions and demands of constructing the enterprise capacity.

Finally, the government shall offer more guidance, effectively provide the information about policy, and help to establish and develop the platforms for the enterprise rapidly.

5. Conclusion

As an important carrier for optimizing and integrating the sci-tech resources to conduct the sci-tech innovation activities and promote the sci-tech achievements, the sci-tech innovation platform is also the main carrier for developing the independent sci-tech innovation capabilities. The development of the textile industry in Shaoxing is need of the support from the sci-tech innovation platform. In the context of the textile industry in Shaoxing, clarifying the organizational structure, operation mode and effectiveness evaluation of the sci-tech innovation platform of the textile enterprises, and discovering the current problems and solutions will not only provide the comprehensive and systematic guidance for the construction of the sci-tech innovation platform for the textile enterprises in Shaoxing, but also provide reference for establishing the innovative sci-tech platforms in other industries and cities.

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