

Types of Organizations and Their Scope of Cooperation in Textile Research Awarded by the National Science and Technology Awards in the Past 40 Years

Ninghui Zhang¹ & Xiaoming Yang¹

¹ College of Humanities, Donghua University, Shanghai, P. R. China

Correspondence: Xiaoming Yang, College of Humanities, Donghua University, Changning, Shanghai, 200051, P.R China. E-mail: yxide@sina.com

Received: August 10, 2023

Accepted: September 15, 2023

Online Published: September 30, 2023

doi:10.5539/ass.v19n5p18

URL: <https://doi.org/10.5539/ass.v19n5p18>

Abstract

The National Science and Technology Award is the highest award in the field of science and technology in the People's Republic of China, which was formally established in 1978 after China's reform and opening up, and it has been forty years since then. The textile award-winning research in the National Science and Technology Award is one of the important characterizations of the progress of textile science and technology and the development of the textile industry. Through the statistical analysis of the research organizations of the textile award-winning research of the National Science and Technology Award from 1979 to 2020, it is found that enterprises have been the most dominant type in the past forty years; research institutes were the important force of textile science and technology research before 2000, but their influence gradually declined after 2000; the scientific research strength of the universities has risen and the scientific research resources are concentrated in the main universities with textile specialties; different types of research organizations have their cooperation methods, and the forty years have experienced the transformation from the intra-city to the intra-country cooperation, among which, the enterprises have the highest degree of freedom on the space of cooperation.

Keywords: National Science and Technology Award, textile science and technology, research institute, reform and opening up

1. Introduction

The National Science and Technology Award is not only a material and spiritual reward for the scientific and technological contributions made by groups or individuals, but also a guideline for the scientific and technological activities of various departments and industries of the country. As part of the reward system of science, analyzing the situation of scientific and technological progress from the perspective of science and technology awards has both historical and guiding significance. This paper begins with textile research that has won national science and technology awards since China's reform and opening up over the past forty years and analyzes the transformation of the institutions that have won the National Science and Technology Award in the textile industry from two aspects: types of organizations and their methods of cooperation.

After decades of development, China's National Science and Technology Award has gradually formed a science and technology award system with Chinese characteristics. The National Science Conference in 1978 was the beginning of the formation of China's current science and technology policy. Based on restoring the science and technology policy before the Cultural Revolution, the national science and technology policy showed some new characteristics and gradually became standardized (Zheng, 2004). Several scientific research organizations and scientific research projects were awarded at the scientific conference, and 222 scientific research organizations and 174 scientific research projects were awarded in the textile industry (Zhou, Zhao, & Bao, 2017, p. 728). After 1979, the National Science and Technology Award was formally established and awarded regularly. The textile industry is a traditional livelihood industry and has international competitive advantages as a pillar industry of China's national economy. Science and technology awards should play a positive policy-oriented role in promoting scientific and technological innovation and progress in the textile industry, accelerating the application and transformation of scientific research and the dissemination of knowledge, and motivating innovative talents to stand out (China Textile Industry Association, 2009, p.11). The analysis of the National

Science and Technology Award in the textile industry over the past 40 years is to improve the working methods of scientists by focusing on the growth of knowledge and the application of knowledge (Wang, Zhong, Ai, Cheng, & Xie, 2000, p. 131).

2. Research Design

2.1 Sample Selection and Data Sources

The data were extracted from three sources: (1) the official website of the National Office for Science and Technology Awards (<https://www.nosta.gov.cn>), which provides information about the winning research of the National Science and Technology Awards and related policy documents; (2) "China Textile Industry Development Report" used to be called China Textile Industry Yearbook, which records the research information of the textile industry that won the National Science and Technology Award over the years; (3) the "China Science and Technology Award Yearbook" contains detailed introductions of all research that have won the National Science and Technology Award.

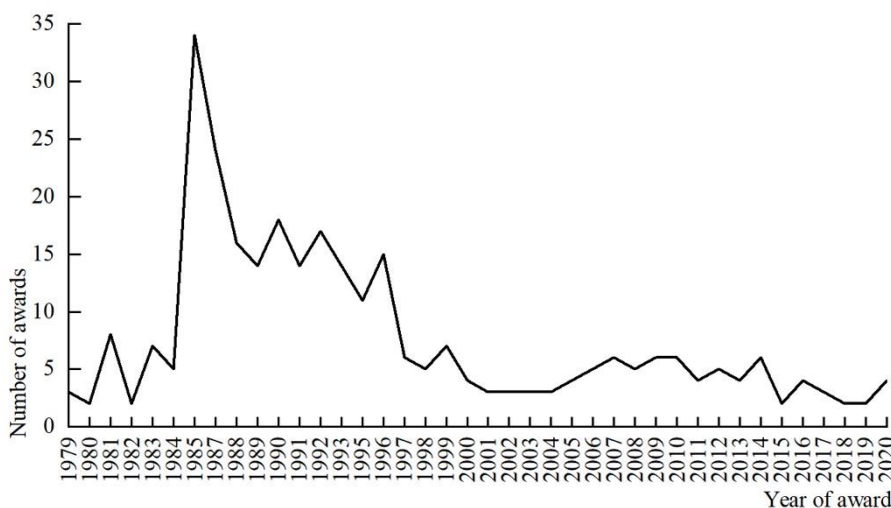


Figure 1. Statistics on Textile Winning Research for National Science and Technology Awards (1979-2020)

As one of the most important industries in the national economy, the textile industry has long occupied a certain proportion of the National Science and Technology Awards. The "Regulations of the People's Republic of China on Science and Technology Progress Awards" promulgated in September 1984 marked the official establishment of the National Science and Technology Progress Award. In 1985, the National Science and Technology Progress Award was officially implemented (Yao, 2007). Since applications for the first National Science Progress Award in 1985 were limited to major scientific and technological research completed after January 1, 1978 (Qu, 2005, p. 114), the number of National Science Progress Awards in 1985 was the largest in history, and the textile industry also had a larger number of awards. The "Regulations on National Science and Technology Awards" implemented in 2000 stipulates that the National Natural Science Award, the National Technological Invention Award, and the National Science and Technology Progress Award shall be divided into two levels, first prize and second prize (previously there were four levels). The number of award-winning studies shall not exceed 400 per year. With the improvement of the science and technology award system, the number of award-winning textile research projects has stabilized after 2000.

2.2 Research Content and Methods

This study statistics and analyzes 306 textile award-winning studies that have won the National Science and Technology Award from 1979 to 2020, and for the convenience of discussion are divided into three periods according to the development of the National Science and Technology Award: 1979-1985, 1986-1999, and 2000-2020. The original information of the award-winning research mainly includes the number, title, content introduction, organizations participating in the research, completer, recommending institution, award level, industry, etc. After statistical sorting and comprehensive analysis of the above information, combined with the objectives of this study, the research content is divided into two aspects: types of organizations and their methods of cooperation. The type of research organization is divided into four categories: enterprises, research institutions,

universities and others. Among them, research institutions specifically refer to research institutions owned by the state, others include governments, groups, hospitals, etc. The method of cooperation refers to the geographic distance when different types of organizations cooperate, and is divided into intra-city, intra-provincial and intra-country based on the setting of the administrative regions of the country.

3. Type of Research Organization

Through statistics of all research organizations that have participated in award-winning research over the past 40 years, the number and proportion changes of the main research organization types in award-winning research in the three periods are shown in the table 1.

Table 1. Number and proportion of award-winning research organizations in the three periods

Type of organization	1979-1985		1986-1999		2000-2020	
	Number of awards	Percentage of awards (%)	Number of awards	Percentage of awards (%)	Number of awards	Percentage of awards (%)
Enterprise	84	59	156	54	126	51
Research institutions	32	23	87	30	20	8
Universities	17	12	39	14	96	39
Others	9	6	5	2	3	1

Note. Each award-winning research is usually completed by one or more research organizations. The statistics in this table include all organizations participating in the research, so the number of organizations is greater than the number of award-winning studies.

From Table 1, it is found that the number and percentage of enterprises participating in the study are the highest in all three periods. Enterprise participation in research was 59% in 1979-1985, 54% in 1986-1999, and 51% in 2000-2020, maintaining the highest but slightly decreasing level of participation. Research institutes' participation in research accounted for 23% in 1979-1985 and 30% in 1986-1999, which were the most involved in research except for enterprises in these two periods, and the number of research institutes' participation decreased sharply in 2000-2020, accounting for only 8% of the total number of research institutes. It can be seen that the degree of participation of research institutions in research is getting lower and lower. The participation of universities in research has been on the rise, accounting for 12% in 1979-1985, 14% in 1986-1999, and 39% in 2000-2020. Colleges and universities are becoming more involved in research and are the second most numerous type of organization after enterprises after the year 2000. All others have participated in only one research project, with the smallest number and decreasing share. In addition, the average number of participating organizations per research study increased in the third period, from 2.33 in 1979-1985, to 1.78 in 1986-1999, and 2.93 in 2000-2020.

The changes in the proportion of different types of organizations in textile award-winning research are affected by national policies. The "Implementation Opinions on the Reform of the Management System of Research Institutions under 10 State Bureaus Administered by the State Economic and Trade Commission" issued in April 1999 reformed the management system of 242 research institutions under 10 state bureaus, including the Textile Bureau, and reformed the state-owned research institutions to be entrepreneurial, and to strengthen the main position of enterprises in technological innovation. The restructured research institutions will be able to give full play to their advantages in technological innovation. For example, the China Textile Academy was transformed into a large-scale scientific and technological enterprise directly under the central government in 1999, called China Textile Science Research Institute Co., Ltd., and Zhejiang Silk Research Institute was transformed into Zhejiang Silk Science and Technology Co., Ltd. in 2001. This is manifested in a sharp decline in the proportion of research institutions participating in award-winning research. However, due to the absorption of transformed research institutions by enterprises, the proportion of award-winning research has increased. The reason for the increase in the number of universities participating in award-winning research may be that the selection of academicians and the approval of doctoral programs have gradually penetrated from universities directly under the Ministry of Education to local universities. Therefore, winning the National Science and Technology Award has attracted more and more attention from textile universities. Given these reasons, now that the textile industry

has entered the stage of high-quality development, it is more important to deepen the enterprise-led industry-university-research cooperation system, to promote the equality and sharing of scientific research strength among backbone enterprises, research institutions and universities, and to enhance the construction of scientific and technological innovation platforms to lead the role of scientific research and innovation (Textile Industry Federation, 2021).

4. Methods of Cooperation Between Research Organizations

Due to the regional characteristics of the distribution of the textile industry, the distribution of organizations participating in the award-winning research in the textile industry presents certain spatial characteristics. The organizations participating in award-winning research are divided by office location. The cooperation between multiple organizations in the same city (including municipalities directly under the central government) is called intra-city cooperation, the cooperation between different cities in the same province is called intra-provincial cooperation, and the cooperation across provinces is called domestic cooperation. Table 2 analyzes the cooperation of research organizations in textile award-winning research at three spatial scales: intra-city, intra-province, and intra-country.

Table 2. Statistics on the method of cooperation of research organizations in three periods

Method of cooperation	1979-1985		1986-1999		2000-2020	
	Number of awards	Percentage of awards (%)	Number of awards	Percentage of awards (%)	Number of awards	Percentage of awards (%)
Intra-city	23	52	26	41	8	12
Intra-provincial	3	7	6	9	3	5
Intra-country	18	41	32	50	54	83

According to Table 2, during 1979-1985, intra-city cooperation with 23 items accounting for 52% was the most dominant method of cooperation, followed by domestic cooperation with 18 items accounting for 41%, and intra-provincial cooperation was the least, with 3 items accounting for 7%; during 1986-1999, intra-country cooperation with 32 items accounting for 50% replaced intra-city cooperation as the dominant method of cooperation, with intra-city cooperation with 26 items accounting for 41% and intra-provincial cooperation is the least, with 6 items accounting for 9%; between 2000 and 2020 intra-country cooperation became the most dominant form of cooperation, with 54 or 83%, accounting for the vast majority of the awarded studies, while the number of intra-city cooperation declined sharply, with only 8 or 12%, and intra-provincial cooperation was the least, with 3 or 5%.

It can be seen that the cooperation methods of research organizations have shown different characteristics over time. In the first stage, because the award-winning research involved a relatively single field and was relatively low in difficulty, intra-city cooperation became the mainstream method. With the development of science and technology and the improvement of requirements for award-winning research, intra-city cooperation can't satisfy the complexity of the research, so it declines to the secondary way; intra-country cooperation is more difficult and requires a higher level of science and technology, so it has long been the most important method of cooperation and its number has been steadily increasing; intra-provincial cooperation has always been less frequent among the three cooperation methods due to the lack of obvious advantages in terms of convenience and technological level.

In addition, different types of research organizations prefer different methods of cooperation. Enterprises have strong technical and capital advantages in the textile industry and have greater freedom in cooperation. The initial cooperation is mostly intra-city and intra-country cooperation and very little intra-provincial cooperation. In the past ten years, it has changed to all intra-country cooperation; the number of research institutions is similar in intra-city and intra-country cooperation, and the number of research institutions decreased year by year due to policy changes; In the early period, due to their weak scientific and technological foundation, universities mostly chose less difficult intra-city cooperation, and the number of intra-provincial and intra-country cooperation was relatively small; in the later period, with the improvement of the theory and technology of colleges and universities, the number of difficult intra-country cooperation increased significantly and became the main method of cooperation. In other words, the methods of enterprise cooperation are more diverse and selective, with intra-country cooperation becoming the main method as the difficulty of research and the industries

involved increase. There are also many methods of cooperation between research institutions, but the tendency is not strong. The methods of cooperation in universities have different tendencies in different periods and have experienced the transformation from intra-city cooperation to intra-country cooperation.

5. Conclusions

In terms of research organization, the average number of participating organizations for each award-winning research has increased; enterprises are the main type of textile award-winning research of the National Science and Technology Award and are the most important participants in textile technology research. They are characterized by a large number and scattered scientific research forces; the rapid growth of scientific research strength in universities provides theoretical research and technical guidance for the development of textile science and technology, which is characterized by a small number and concentrated scientific research strength; affected by the policy, the scientific research strength of research institutions has declined, and their role in the development of textile science and technology has gradually weakened.

By analyzing the methods of cooperation from research organizations, it is found that the method of textile award-winning research cooperation has experienced a shift from predominantly intra-municipal cooperation to predominantly intra-country cooperation; different types of organizations choose different methods of cooperation, and enterprises have a higher degree of freedom in the choice of methods in their cooperation, and prioritize the cooperation method that can satisfy their own research needs. as a result, there is a change from both intra-city cooperation and intra-country cooperation to all intra-country cooperation; in the process of the research foundation of universities changing from weak to strong, the method of cooperation has changed from mainly intra-city cooperation to intra-country cooperation; the spatial tendency of scientific research institutions to cooperate is not strong, so they do not have advantages, and the research they participate in decreases year by year.

References

- China Textile Industry Association. (2009). *China Textile Science and Technology Awards for Thirty Years (1978~2008)*. Beijing: China Textile Press.
- Qu, A. (2005). *Science and Technology Award in modern China*. Jinan: Shandong Education Press.
- Textile Industry Federation. (2021). Guiding Opinions on Technology, Fashion and Green Development of the Textile Industry during the "14th Five-Year Plan". *Textile Science Research*, 8, 28-44.
- Wang, Y., Zhong, S., Ai, Y., Cheng, L., & Xie, A. (2000). *Science and Technology Rewards*. Wuhan: Huazhong University of Science and Technology Press.
- Yao, K. (2007). *Research on China's science and technology reward system*. University of Science and Technology of China, Hefei, China.
- Zheng, Q. (2004). Primary discussion on Chinese science policy around the national science conference in 1978. *Journal of Dialectics of Nature*, 26(4), 56-62. <https://doi.org/10.3969/j.issn.1000-0763.2004.04.013>
- Zhou, Q., Zhao, F., & Bao, M. (2017). *General history of Chinese textiles*. Shanghai: Donghua University Press.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).