# Innovation of Science and Technology Commissioner System in Tianjin

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**ABSTRACT**
2020 is the year that the goal of building a moderately prosperous society in all respects will be realized, and it will be a year that the fight against poverty will be fully won. This research analyzes the status quo based on the work results and experience of the science and technology commissioner system, and puts forward the main problems of the science and technology commissioner system, such as insufficient investment funds, team building to be strengthened, lack of long-term mechanisms, and incomplete incentive mechanisms. In addition, the study uses questionnaire surveys, document analysis and other methods, combined with the new situation and new challenges faced by the new era and new agriculture, rural areas and farmers, and puts forward four corresponding countermeasures: establish a multi-channel funding mechanism; the construction of science and technology commissioners needs to be strengthened; establish a long-term mechanism for industry-university-research cooperation with enterprises and farmers; improve incentive mechanisms.

***Keywords:*** *Science and technology commissioner, Innovation, Tianjin.*

## 1. INTRODUCTION

The development of agricultural science and technology is a major engine of rural economic development and plays an important role in promoting farmers' income [1]. As a system for promoting technology and talents to the countryside, the science and technology commissioner system takes commissioners and farmers as the main body and meets the needs of rural technology as the starting point. Since the pilot work of the science and technology commissioner system was launched in 2004, Tianjin has been actively exploring the operation mode and mechanism of the science and technology commissioner system. It has set up special funds for scientific and technological commissioners to support scientific and technological projects, carry out scientific and technological training activities, establish workstations for scientific and technological commissioners, and business service projects for scientific and technological commissioners.

As Tianjin continues to promote and improve the science and technology commissioner system, the science and technology commissioner system has become an important method of agricultural promotion in the new era. Most of Tianjin science and technology commissioners come from the field of planting and breeding. They carry out technical guidance, training around characteristic industries, advantageous industries and so on. They are of great help to the adjustment of the agricultural industry structure. However, in the new era, agriculture faces new challenges. In order to better play the role of special commissioners, the key is to improve the system of scientific and technological commissioners.

## 2. CURRENT SITUATION OF TIANJIN SCIENCE AND TECHNOLOGY COMMISSIONER SYSTEM

### *2.1. Science and Technology Commissioner has Achieved Remarkable Results*

In 2019, Tianjin took the agricultural science and technology commissioner system as the main focus of rural revitalization. To this end, 81 scientific and technological assistance teams were established. The number of science and technology commissioners and the number of difficult villages assisted both exceeded 1, 000. Among them, Tianjin's difficult villages are almost covered. At the same time, Tianjin has also

initiated the implementation of the Five New Projects for the transformation of scientific and technological achievements, promoted 60 universities and institutes to implement the achievement transformation policy, newly selected more than 1,200 enterprise scientific and technological commissioners to settle in more than one thousand service enterprises, and gradually established a scientific and technological achievements "Supply-Demand-Service" tripartite market mechanism [2].

As of August 2019, a total of 4,378 scientific and technical personnel have been selected and dispatched to the grass-roots level to provide services, and the team has continued to grow. In addition, the work of science and technology commissioners has achieved remarkable results, as shown in Table 1. In 2020, Tianjin will continue to focus on agricultural science and technology on adhering to science and technology for the people and implementing the promotion of science and technology commissioners. It is not only necessary to promote the sinking of talents and serve the "agriculture, rural areas, and farmers", but also to strengthen technological assistance for characteristic industries, and promote the online assistance model of "Tianjin Technology Assistance".

**Table 1.** Work Results of Tianjin Science and Technology Commissioner

| Content | Statistics |
|---|---|
| Science and technology enterprises served by science and technology commissioners | 3754 |
| The scientific and technological achievements transformed by scientific and technological commissioners into enterprises | 1502 |
| Technical problems in the production process and new product development of the enterprise solved by the science and technology commissioner | 3767 |
| Companies that have reached cooperation agreements with science and technology commissioners | More than1400 |

[3] XinHua Net

### *2.2. Science and technology Commissioner System is Constantly Improving*

In 2004, Tianjin carried out pilot work of science and technology commissioners in three districts and counties in accordance with the work deployment of the Ministry of Science and Technology. In 2009, the science and technology commissioner system was listed as one of Tianjin's 20 People's Heart Project. In order to further explore the establishment and improvement of the science and technology commissioner system, Tianjin, on the basis of the original pilot work, carried out the entrepreneurial service action for science and technology commissioners to the city, and issued the Plan on Carrying out the Entrepreneurship Service Action for Science and Technology Commissioners. In 2013, Tianjin issued Detailed Rules for the Implementation of Tianjin Science and Technology Commissioners (Trial) (2013) to further clarify and implement the work of science and technology commissioners, give full play to the advantages of scientific and technological resources, talents and promotion the cooperation between universities as well as small and medium-sized technology-based enterprises in industry, education and research. In 2017, in order to deepen the reform of the supply side of science and technology, promote the transfer of science and technology elements from universities and research institutes to enterprises, promote industrial transformation and upgrading, the Implementation Rules for the Work of Tianjin Enterprise Science and Technology Commissioners (Trial), it has revised by Tianjin Municipal Science and Technology Commission and the Municipal Education Commission.

At present, it is the science and technology commissioner system that has encouraged a large number of commissioners to go to the grass-roots level to provide scientific and technological services. They not only impart agricultural scientific and technological knowledge to farmers, but also improve the agricultural scientific and technological system, so that the effect is remarkable. On the whole, the science and technology commissioner policy is improving. However, Tianjin faces new developments in the new era, new countryside, and some problems remain to be resolved.

## 3. THE MAIN PROBLEMS AND RESTRICTIVE FACTORS IN THE SYSTEM OF SCIENCE AND TECHNOLOGY COMMISSIONERS

### *3.1. Insufficient Funds Available for Science and Technology Commissioners*

The system insists that talents and technology go to the grassroots level to serve agriculture, rural areas and farmers. The team continues to grow, and has gradually become the disseminator of agricultural science and technology, the leader of technological innovation and entrepreneurship, and the leader of rural poverty alleviation and prosperity [4]. The system guides scientific and technological talents to go to the grassroots level in rural areas, and establish a community of interests with farmers and enterprises by creating projects. Sufficient financial support is needed whether it is the initial stage of the project, the development of scientific and technological services, technological innovation, or the transformation and promotion of technological achievements [5]. The

survey shows that 76. 09% of survey respondents believe that insufficient funds to support project requirements are a major factor affecting the function of science and technology commissioners. In addition to daily funding support, the government will reward and support special commissioners who have performed outstandingly or have made significant achievements and contributions. They also support the establishment of outstanding projects for the projects applied by special commissioners with outstanding assessments and significant results in industry-university-research cooperation. However, due to the large demand for funds in scientific and technological innovation, the implementation and transformation of scientific and technological achievements, and entrepreneurship, as well as the relatively simple capital investment mechanism, the project funds for the commissioners are still in short supply [6].

### *3.2. The Construction Of Science and Technology Commissioners Needs to be Strengthened*

The problems faced by agriculture are complex, and the level of mastery of the situation at the grassroots level by special commissioners is uneven. The survey found that 60. 9% of the survey respondents did not participate in the training before conducting scientific and technological services. Although the commissioner has certain theoretical knowledge and scientific research capabilities, it is still necessary to investigate whether they has the ability to serve at the grassroots, such as the method of delivering technology, the ability to listen to or discover the demands of enterprises and farmers, and modern management concepts. The demand for technology in agriculture is diverse and complex. In addition to the production process, there are also some difficulties in the processing, storage, and transportation of agricultural products, and there is a shortage of relevant talents [7]. Nowadays, the knowledge and skill structure of science and technology commissioners is relatively simple, and they are mostly suitable for the pre-production and mid-production links of agricultural products, which do not meet the diversified needs of agriculture.

### *3.3. The Science and Technology Commissioner System Lacks a Long-Term Mechanism*

The commissioners are selected from various departments, and the team is composed of personnel from different units and different levels. This organizational structure is relatively loose, and there is a flow of special personnel after the expiration of the service period. The survey shows that 54. 35% of the respondents believe that the main difficulties faced by the current science and technology commissioner system include the lack of a stable service structure and long-term mechanism. 39. 13% of people think that a major factor affecting the role of the commissioners is the poor sustainability of assistance. Due to the lack of a long-term mechanism, the technology commissioner system also loosens the relationship between technology commissioners. 45. 65% of the survey respondents believe that insufficient synergy between commissioners is also a major problem faced by the technology commissioners system. Rural science and technology promotion and agricultural science and technology services, as a long-term task, usually require a team to form a long-term cooperation. Whether it is to develop technological products, technical solutions and other scientific and technological achievements, or to apply scientific and technological achievements to the fields and promote them among enterprises and farmers, it takes time. It is difficult for a team of temporarily established and loosely-connected science and technology commissioners to play a greater role, but long-term and continuous scientific and technological assistance can make greater contributions in the agricultural field.

### *3.4. The Incentive Mechanism for Science and Technology Commissioners is Not Sound*

The commissioners serve agriculture, rural areas and the grassroots, but the economic remuneration, political treatment and attention they receive in science and technology services are still insufficient. The units and agencies of the commissioners are many and complex. Many incentive measures cannot be implemented, and it is difficult to guarantee the personal rights and benefits of science and technology commissioners, which affects the function of the science and technology commissioners system to a certain extent. The Detailed Rules for the Implementation of the Work of Tianjin Enterprise Science and Technology Special Commissioners stated that during the period of dispatch of science and technology commissioners, their salaries, positions, title promotions, and job changes are treated the same as those in the institutions of higher learning. This makes some commissioners have a lower sense of accomplishment in rural grassroots scientific and technological assistance, and reduces the initiative of the commissioners. More than half of the survey respondents believe that the lack of incentive mechanism of the unit where the science and technology commissioners work is a major factor affecting the enthusiasm of the science and technology commissioners to undertake the assistance task. 71. 74% of the survey respondents believe that the system of scientific and technological commissioners should be improved through a sound incentive mechanism.

## 4. SPECIFIC SUGGESTIONS ON INNOVATING TIANJIN SCIENCE AND TECHNOLOGY COMMISSIONER SYSTEM

### *4.1. Establish a Multi-Channel Capital Investment Mechanism*

Tianjin should increase investment in science and technology, establish a multi-channel capital investment mechanism, and gradually form a diversified, multi-channel and high-efficiency science and technology investment system composed of the government, enterprises, and society. On the premise of increasing investment in science and technology, the government should actively mobilize and guide the investment of other social resources such as social organizations, enterprises, and large farmers. In addition, the government should also give full play to the guiding role of capital investment, encourage and guide enterprises, farmers, entrepreneurs, and major professional households to carry out technological innovation and increase technological investment. Enterprises are more sensitive to the market. Tianjin should increase social capital investment, be guided by the needs of enterprises, and concentrate funds to solve key problems in enterprise production, so that science and technology commissioners can play a greater role. In addition to government support and social capital, financial institutions can also be fully mobilized. On the premise of improving relevant financial policies, the government can actively guides various financial institutions to provide financial support for technological innovation. It is conducive to the development of science and technology commissioners, and is conducive to solving the problem of insufficient funds in the stages of technological innovation, technological entrepreneurship, transformation of technological achievements, and promotion of technological achievements that adhere to the guidance of government investment and social capital as the main source, broaden financing channels, increase the amount of capital, and improve the quality of capital.

### *4.2. Strengthen the Construction of Science and Technology Commissioners*

Firstly, facing the diversification of agricultural needs, Tianjin can form a team of technical commissioners with diversified skills, and assign commissioners in response to different problems faced by enterprises and farmers in various links. Secondly, it is necessary to strengthen the management training of special commissioners to improve their service skills and business level. For example, cutting-edge science and technology, the method of transferring technology, the way of communication with enterprises and farmers, Ability to grasp market trends, etc. Thirdly, it is also important to strengthen the communication between science and technology commissioners and realize information sharing, so that the commissioners can grasp a wider range of first-hand information, which is conducive to work and avoid problems [8]. Finally, it can also improve the quantitative assessment system, not only focusing on the implementation and transformation of scientific and technological achievements, but also examining the effects of commissioners' assistance, such as production efficiency, production scale and income level.

### *4.3. Establish a Long-Term Mechanism for Industry-University-Research Cooperation with Enterprises and Farmers*

On the one hand, the commissioners can go to the grassroots to provide scientific and technological assistance to solve practical problems. On the other hand, they can make scientific and technological innovations based on actual problems, compile practical scientific and technological achievements and implement them, so as to solve the scientific and technological problems encountered in agricultural development for more enterprises or farmers. The science and technology commissioner system, as the general starting point for solving the issues of agriculture, rural areas and farmers in the new era, needs to establish a long-term mechanism to stabilize the role of scientific and technological commissioners [9]. On the one hand, the long-term mechanism of industry-university-research cooperation can improve the technological level of enterprises, open up the intermediate links of agricultural technology from production to application, and accelerate the commercialization and industrialization of scientific and technological achievements [10]. On the other hand, industry-university-research cooperation has an impact on the academic and innovation performance of researchers [11]. It can alleviate the pressure of scientific and technological innovation and research and development work of science and technology commissioners, and help accelerate the research and development of scientific and technological achievements. The establishment of an industry-university cooperation mechanism can first create a platform for industry-university-research cooperation and information sharing, and use modern information technology communication tools to disseminate agricultural information in rural areas to meet farmers' needs for agricultural information [12]. Next, Tianjin can cultivate an intermediary service system for industry-university-research cooperation, strengthen the connection between enterprises and universities, and provide supervision and guarantee for the whole process of technological achievements transformation. Finally, it is possible to improve the benefit distribution

mechanism and combine the development and transformation of scientific and technological achievements to safeguard the interests of scientific and technological commissioners, entrepreneurs and investors.

### *4.4. Sound Incentive Mechanism*

Personal achievement needs are the main motivation for self-realization and the endogenous motivation of the incentive mechanism for science and technology commissioners. The commissioners participate in science and technology assistance activities in order to give full play to their abilities and values to obtain a higher social status and a larger platform [13]. On the one hand, it is necessary to make the commissioners have a sense of accomplishment in the work of grassroots science and technology assistance. After the work assessment of the science and technology commissioner, the original unit can refer to the commissioner's work experience, work performance, scientific and technological achievements, etc. in the evaluation of the professional title and job promotion. Under the same conditions, the original unit can give priority to science and technology commissioners, such as job appraisal, award appraisal and excellent appraisal [14]. On the other hand, it can establish a reward fund for science and technology commissioners. Rewards will be given to science and technology commissioners who have achieved remarkable results in scientific and technological assistance, outstanding performance, and more transformation of scientific and technological achievements. In this way, on the basis of ensuring the distribution of benefits of scientific and technological commissioners, the enthusiasm and subjective initiative of the commissioners will be mobilized.

## 5. CONCLUSION

As a powerful engine to promote grassroots technological innovation, science and technology commissioners are an important starting point for promoting rural revitalization. This research is based on 46 questionnaires of science and technology commissioners. Based on the problems faced by commissioners in the grass-roots service work and their demands, this research summarizes the four main issues that restrict the development of the science and technology commissioners system, and puts forward corresponding suggestions:

(1) In terms of funding, research suggests that a multi-channel funding investment mechanism should be established to form a diversified, multi-channel, and highly efficient technology investment system jointly established by the government, enterprises, and society.

(2) With regard to the team building of science and technology commissioners, the research suggests that a team of commissioners with diversified skills should be formed, the management training of commissioners should be strengthened, and the quantitative assessment system should be improved.

(3) In view of the lack of a long-term mechanism in the system, the research suggests creating a platform for industry-university-research cooperation and information sharing, fostering an intermediary service system for industry-university-research cooperation, and improving the benefit distribution mechanism to establish a long-term mechanism for industry-university-research cooperation.

(4) Aiming at the problem of imperfect incentive mechanism for science and technology commissioners, the research believes that it can be started from two aspects: the job evaluation and appointment of the original unit of the commissioners, evaluation of excellence and first, etc. ; establishment of incentive funds for scientific and technological commissioners.

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