

# On the Development of Science and Technology Service Industry of Shenyang City

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## Abstract

As part of modern service industry, science and technology (Sci-Tech) service industry plays a very important role in national economy and social development. The development of sci-tech service industry is not only related to the promotion of city's synthetic strength and industrial competitiveness, but also significantly influences other industries. During the development process of Shenyang's sci-tech service industry, several problems have emerged, such as low level of marketization, lack of excellent persons, which should be resolved in the following aspects as proposed in this paper: consummate organizational structure, increase governmental investment, consummate relative policies, and so on.

**Keywords:** Sci-Tech service industry, Marketization, Sci-Tech agency

## 1. Theories on Sci-Tech Service Industry

### 1.1 Literature Review on the Concept of Sci-Tech Service Industry

At present, China's scholars define sci-tech service industry in two categories. One category is "Purpose Theory" represented by Hang Yan (2006) and Wang Liang (2007). They claim, "sci-tech service industry is the integration of all the organizations or institutions which provide with various services for promoting advancement- and management level of science and technology". Actually they think sci-tech service industry can just provide with services for sci-tech activities, but ignore the institutions or organizations which provide with services by utilizing sci-tech means, such as the service institutions with test service, data processing and so on. The other category is "Means Theory" represented by Wang Jing (2006) and Chen Xianrong (2005). They declare, "sci-tech service industry is for providing society with services by technology and knowledge, so its service means are technology and knowledge, and service objects are all social industries". Herein "science and technology" is the attribute of "service", i.e. service industry in category of science and technology, which is similar to knowledge-intensive service industry. However, the above points of view only describe certain characteristics of sci-tech service industry incompletely.

When defining the extension of sci-tech service industry, the academe classifies it in different ways, such as into two, three, four or five categories. For instance, Yang Jizheng (2003) classifies sci-tech service industry into three categories. They are (1) the institutions directly participating technology innovation process of service objects, such as incubators, R&D center of engineering technology; (2) the institutions providing technology innovation subjects with counseling by using technology and management knowledge, such as productivity promotion center, service center for starting business by science and technology; (3) the institutions providing with sci-tech agency service for effective flow of sci-tech resources, such as patent office, technology market. Wang Jing (2006) divides sci-tech service industry into five sub-systems based on service content, i.e. sci-tech information, sci-tech establishment, sci-tech trade, sci-tech finance and enterprise incubators.

### 1.2 Connotation of Sci-Tech Service Industry

As stated above, the definition of sci-tech service industry should not only embody the sci-tech quality of service objects, but also of service means. Therefore, sci-tech service industry can be defined as: in a certain region, the integration of all the organizations or institutions with independent accounting, which provide the production, transmission and application of science and technology with intelligence service by utilizing modern scientific knowledge, modern technical means and analysis methods, in order to promote advancement of sci-tech and of management level.

### 1.3 The Extension of Sci-Tech Service Industry

According to the above connotation of sci-tech service industry, referring to the industry classification of China Statistics, and combining the process of sci-tech innovation, we classify sci-tech service industry into three

categories.

The first category refers to scientific research and experiment development, including natural scientific research and experiment development, engineering and technology research and experiment development, agriculture scientific research and experiment development, medical research and experiment development, social literae humaniores research and experiment development.

The second category refers to sci-tech communication and extending service, including technology extending service, sci-tech service, intellectual property right service, and other technology service.

The third category is professional technology service, including weather service, earthquake service, ocean service, mapping service, technology examination, environment inspect, engineering technology and layout management and other professional technology service.

#### *1.4 Main functions of Sci-Tech Service*

##### *1.4.1 Information Service*

They intend to advance enterprises' market forecast and quick response and propose scientific strategy for enterprises by providing with policy and regulations, economic and scientific development tendency, science and technology productions, technology demand, investment and financing channels, human resource, marketing and other information service such like, through traditional publications, professional websites, news releasing, communication conference, specialist consultation and various media.

##### *1.4.2 Development and Extending of Technology*

They organize and utilize all kinds of social resources effectively so as to help middle-small sized enterprises to research and develop new technology and products. Moreover they hold various new technology promotion activities to spread advanced and practical technology, transfer and spread technology with good market foreground, high content, high added value, and strong industry relevancy, outstanding economic and social benefits to enterprises.

##### *1.4.3 Technology Transaction Service*

They offer policy consultation, patent agency; contract register, transaction contract cognizance and intellectual property right service, so that a new technology transaction service system of high efficiency and reputation is formed.

##### *1.4.4 Enterprises Incubating Service*

They offer middle-small sized enterprises fields for R&D, production and operation, as well as communication, network, offices and other shared establishments. They also give overall aid in law, policy, information, management consultation, technology diagnosis, marketing, financing, intellectual property rights, human resources, and help them reduce risks and cut cost for setting up a business, and then become bigger and stronger.

##### *1.4.5 Innovation Training Service*

They hold short-term trainings, lectures, seminars, classes, and so on to offer new enterprises human resource management, financial management, technology innovation, marketing, social insurance, intellectual property rights protection, production standard, international trade and other training services. Thus they enlarge and enrich new business persons' knowledge level, enhance their innovation consciousness, market consciousness and competition consciousness in order to improve the innovation capability of the subjects.

## **2. Development Situation of Sci-Tech Service Industry of Shenyang City**

### *2.1 R&D Service Develops Rapidly*

According to statistic caliber, R&D service mainly refers to research and experiment development, i.e. research of new discovery, new theory, new technology, new crafts, including fundamental research, application research and experiment development. Statistic data show there are 107 governmental scientific research institutions with 14,000 participators, and 1100 non-governmental agency institutions engaging in R&D and technology trade with 25,000 participators (according to project investigation statistic) in Shenyang in 2008. At present, there are 136 engineering (technology) research centers (14 on national level), 168 key laboratories (12 on national level), and 81 enterprise technology centers (13 on national levels) on or above province level in Shenyang.

### *2.2 Technology Trade Value Increases Yearly*

According to statistic caliber, service industry for technology communication and spreading mainly includes

technology spreading service, sci-tech agency service, and other sci-tech service. Currently, 524 enterprises and agency institutions have registered in Shenyang Technology Market, who fulfilled technology trade contract value of 5.806 billion Yuan in 2008, and 6.747 billion Yuan in 2009, when there are 2.5 billion Yuan for technology development, 327 million Yuan for technology transfer, 2.1 billion Yuan for consultation and 1.82 billion Yuan for technology service.

### *2.3 Public Sci-Tech Service System have Grown Up*

There are 65 sci-tech incubators in Shenyang City, thereinto 7 on national level covering 2.78 million m<sup>2</sup>. Two state-leveled university Sci-Tech Parks—Northeastern University and Shenyang University of Technology, Shenyang Sci-Tech Innovation Park of Chinese Academy of Sciences, Hunnan Cartoon Industry Park and so on, have been established one after another. Since 2008 476 sets of research apparatus have connected with shared platform of network for large-sized equipments, which have supplied 3000 times of services to innovation and starting business. A variety of sci-tech investment and financing institutions of Shenyang have reached 56 in 2009, with 14.2 billion Yuan of total financing value. There are 17 patent agency organizations which applied 7,708 patents with 2,920 invention patents in 2009.

### *2.4 Extending Professional Technology Service Field*

According to statistic caliber, professional technology service consists of 10 varieties, like technology inspect, engineering technology and layout management, reconnaissance design, project management, and other professional technology service. At present, many institutions in Shenyang have applied modern service means to enlarge professional technology service field, along with higher level and stronger ability of the services.

## **3. Problems Confronting Shenyang's Sci-Tech Service Industry**

### *3.1 Low Level of Opening to the Outside World*

Currently, most of the big sci-tech service institutions in Shenyang City are branches of governmental organizations. And some sci-tech consultation institutions are mostly established inside certain research institutions or universities, which results in their over dependence on parents institutions, lack of independence and development, low level of opening out, poor service and low efficiency, and lack of driving power to develop good service to the market.

### *3.2 Low Marketization*

Most sci-tech service institutions only have single function and similar service method to structure. Also most of them are limited within information collection and sending, technique consultation and instruction, exhibition of sci-tech achievements or negotiation of transactions, but without being properly combined with market factors, like capital, talented persons, policy, law and management, which cause weak systematic service capacity and small-sized industry.

### *3.3 Insufficient Governmental Investment*

Currently, many regions in China pay high attention to sci-tech service industry. For instance, Shanghai, Nanjing, Wuhan, Hangzhou and other developed cities all set down policies and countermeasures, and also increase governmental investments. While in Shenyang City, the government invests relatively less inductive capital in sci-tech service industry. The foundation of sci-tech service industry is very weak. Shenyang City produces over 6000 pieces of patent technology every year, but the government invests so little in promoting patent's application and transfer.

### *3.4 Lack of Professional Talented Persons*

Along with the rapid adjustment of industrial structure in Shenyang City, the demand for sci-tech service is increasingly growing. However, due to lack of top marketized persons in the industry, its development is deeply affected, and its driving and supporting manufacture industry are hard to accomplish as well.

## **4. Countermeasures to Developing Sci-Tech Service Industry of Shenyang**

### *4.1 Enhance Organization and Guidance*

Sci-tech service industry has its own developing requirements and conditions. But how should we expedite the development of Shenyang's sci-tech service industry? We think, as far as current situation is concerned, government powerful impulse is quite necessary. We need to more clear the responsibilities of governmental directing departments, strengthen the coordination with all governmental departments related to sci-tech service industry, and form a healthy management system.

#### 4.2 Enhance Policy Support to Sci-Tech Service Industry

We should actively utilize governmental inductive capital on service industry to expedite the development of Shenyang's sci-tech service industry, carry out the document, "Several Policies and Countermeasures to Expediting Developing Sci-Tech Service Industry of Shenyang City", set down corresponding policies on promoting sci-tech service industry of Shenyang City, and offer financial support to enterprise lands, office rent, etc. for sci-tech service industry. We also need to broaden register limitation of sci-tech service enterprises. Private capital and FDI should be backed to establish sci-tech service institutions. In order to fulfill particular service project, sci-tech service institutions will retain specialists with overseas studying experiences, whose consultation fees and salary may go into cost directly.

#### 4.3 Expedite Changing Operation Mechanism and Support Private Sci-Tech Agency Institutions

We are supposed to expedite separating public- and non-public-benefit business inside sci-tech service institution, and on the basis of ensuring public-benefit services, promote other business to the market. Centering on establishing and consummating stimulating mechanism, we should actively improve inner system construction. We need to encourage social forces to initiate various sci-tech agency institutions, and encourage and support relatively rich scientific research institutions, colleges and universities to take good advantages of research equipments and talented persons to set up sci-tech agency institutions. Especially we should encourage private enterprises to initiate independently or cooperate with other social forces to start sci-tech service centers, productivity promotion centers, and so on. We also need to encourage foreign organizations and individuals to establish various sci-tech agency institutions in Shenyang.

#### 4.4 Strengthen Construction of Key Sci-Tech Service Institutions

Some selected sci-tech institutions should be offered with supports, such as, fundamental productivity promotion center, service center for starting sci-tech business, sci-tech information service institution, intellectual property rights service institutions, technology trade institutions, sci-tech consultation institutions, investment and financing institutions for sci-tech business, and also including transfer of function, agency service platform construction and training of participators. All the above should be promoted on service quality so that they can become the main force of sci-tech innovation service transfer of sci-tech achievements and technology.

#### 4.5 Establish Business Center of Sci-Tech Agency Service and Construct Industry Cluster

Some regions or counties with good conditions should take good advantages of their own location, and situated on first-class brand of sci-tech agency service. So we need to integrate all kinds of present sci-tech agency institutions so as to make centralized distributing of them inside the region, which contribute to a cluster of sci-tech agency service with characteristics and brand effects. Aiming at construction needs of West Shenyang Industry Aisle, Hunnan New Developed Area, North Shenyang New Developed Area, we have to face advantageous industrial developing demand and entirely promote the cluster and development of modern sci-tech service industry emphasizing on industrial technology advancement. Thus West Shenyang, Hunnan and North Shenyang, these three top sci-tech service industry clusters, will be formed, along with optimized layout of sci-tech service industry.

#### 4.6 Promote the Quality of Participators of Sci-Tech Agency

We need to sufficiently mobilize the colleges and universities in Shenyang City to construct relevant subjects of sci-tech service industry in order to train top talented persons of sci-tech service. We also induce all sorts of training institutions to combine with market demand so that they could expand the trainings to sci-tech service participators of sci-tech consultation, sci-tech evaluation, project management, technology broker, and so on. Based on the principle of "training separately, but promoting entirely", we could heighten overall quality of participators of sci-tech service, with incumbency training and qualification training as main parts. By recruitment and business alliance, we may collect domestic and foreign talented, managerial and professional persons with high operation quality and innovation ability so as to drive, sustain and lead the development of sci-tech service industry. So we should encourage and support sci-tech service institutions to promote participators' operation level.

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#### References

Cao Liyan. (2007). Developed Countries' Experiences on Establishing Sci-Tech Service System. *Science and Technology Management Research*.

- Du Zhenhua. (2009). Making Reasonable Admittance Requirements on Sci-Tech Service Industry. *China Venture Capital*.
- Hang Yan. (2006). Current Situation and Developing Countermeasures to Suzhou's Modern Service Industry. *Market Weekly* (Disquisition Edition)
- Jiang Yongkang and Mei Qiang. (2010). On the Concept and Extension of Sci-Tech Service Industry. *Commercial Times*.
- Wang Jing and Tan Qingmei. (2006). Analysis for the System Function of S&T Service Industry. *Science & Technology Progress and Policy*.
- Wang Jing. (2006). The Research on the Problems of Developing Science and Technology Service Industry of Nanjing. *Science & Technology Progress and Policy*.
- Yang Jizheng. (2003). Countermeasures to the Development of China's Sci-Tech Service Industry. *Science & Technology Progress and Policy*.