

Unified Metropolitan Technology Market of the Yangtze River Delta in China and its Operational Mechanism

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ABSTRACT

The Yangtze River Delta develops much faster than the other Metropolitan regions in China. This paper explores on the construction of the unified technology market in metropolitan region, gives prominence to the unification of the technology markets in the area, and emphasizes on sharing of technology trade information and the vertical integrative service of technology agents.

At present, the main problems in the technology market of the 16 cities in the Yangtze River Delta are as below, (1) weak collaboration between cities; (2) low implementation rate of technology trade contracts; (3) imperfect system of technology agent service; (4) lack of unified technology market supervision.

The domestic technology market in each city is restrained by administrative partitions, and they haven't fully worked for the development of innovation system of metropolitan region. So it is required to build a unified technology market in the Metropolis. After analysis of the attributes that the unified metropolitan region technology markets should have, a structural model is proposed.

Finally, the mechanism of the unified technology market of metropolitan region is studied, specifically the mechanism of agents' organization, the connection of information system, the restriction of the actors, and the market supervision.

INTRODUCTION

Urbanization is becoming more and more in evidence in the past half century. Some metropolitan regions have been forming after China opening to the outside world and carrying on reform policy in 1978. The Yangtze River Delta centered in Shanghai is a leading one in China. Besides Shanghai, this delta contains other 8 cities of Nanjing, Suzhou, Wuxi, Changzhou, Zhenjiang, Nantong, Yangzhou and Taizhou in Jiangsu province and 7 cities of Hangzhou, Ningbo, Jiaxing, Shaoxing, Huzhou, and Zhoushan and Taizhou in Zhejiang province. The land area accounts for 1% of China, population 5.8% and GDP more than 20%.

In the background of building an innovative nation in China, there are a lot of technology achievements and many technology trades in the innovation system of the Yangtze River Delta in recent years. But there exist many problems such as low rate of technology transaction (buying and selling), low rate of new technology commercialization and industrialization. In the process of technology innovation, technology transaction bears the functions of new technology commercialization and is a important driving force of technology innovation. To build a matured technology market is a major path to solve the above problems. At present, technology markets develop smoothly. However, every city's technology market is comparatively independent and there is a lack of connection and interaction one another. This situation restricts efficiency of technology transaction in the metropolitan region of the Yangtze River Delta.

Two important characteristics of metropolitan region innovation system are that innovation factors may flow and interact across different districts and innovation players can cooperate in industrial chain. Therefore, it is necessary to build a unified technology market of the metropolitan region as an infrastructure to collocate innovation resources. This unified market may provide a good marketing environment for technology transaction, buildup communication of technology information, low disadvantage impact on technology transaction resulting from complexity of technology transaction itself, decrease unnecessary overlap construction and evil competition, promote flowing and diffusing of technology in metropolitan region so as to enhance capability of technology innovation of entire region.

TECHNOLOGY TRANSACTION IN THE YANGTZE RIVER DELTA

From current technology transactions of 16 cities in the Yangtze River Delta, these cities may be classified into three levels. The first contains Shanghai only, which bears obvious advantage. The second level houses Nanjing, Hangzhou, Suzhou, Wuxi and Ningbo. The others fall into the third level. The reasons differences existing among these 16 cities are as follows.

Firstly, it is related to different levels of economic development in different cities. Shanghai is premier city in the delta and is also national economic center. Cities at the second level develop fast and come forth many high-tech firms. Economic development in the remaining cities is comparatively weak and technology transactions are comparatively few.

Secondly, it is related foreign investment. A lot of foreign investment comes into cities of Shanghai, Suzhou and the like. With increasing of foreign capital and establishment of foreign R&D organizations, high and new technology industry advances fast, technology

spillover effect is resulted in through competition, imitation and intellectual flow.

Thirdly, it is related to functions different city bears. Shanghai, as core city of the metropolitan region, pools outstanding enterprises and intellectuals in manufacturing, financial, tertiary industries, leads technology development innovation direction of the whole region. Cities at the second level go fast in manufacturing production and using foreign direct investment, breeding a lot of technology activities and transactions.

To consider the development of technology market of the Yangtze River Delta, there are some problems

1. Weak connection among different cities in the Yangtze River Delta
2. Low implementation rate of technology trade contracts
3. Imperfect system of technology agent service
4. Lack of unified technology market supervision

THE MODEL OF UNIFIED TECHNOLOGY MARKET IN THE YANGTZE RIVER DELTA

Metropolitan region is a higher form in urbanization process, one protruding characteristic of metropolitan region innovation system is both corresponding and conflict between it and administration districts of cities. Metropolitan region innovation system strides whole metropolitan region and need commonly organizing innovation activities. Innovation players and communication between them are not restricted in a single city. Metropolitan region technology market should make new technology transfer smoothly fulfilled in metropolitan region and technology information easily got, and have uniform supervision organization and measures. This common organization is the unified metropolitan region technology market.

Characteristics of metropolitan region unified technology market

The aim to build a unified technology market is to clear up the difficulties and problems in technology transactions, to satisfy the needs of both buyers and sellers, and make smooth process of technology transfer crossing different cities. Therefore, this market should bear the following characteristics.

1. Unification of technology transaction information
2. Unified supervision on technology transaction
3. Unified regulations of technology transaction
4. Unified conception of technology transaction

The model of unified metropolitan region technology market

Based on the above, it is necessary for the Yangtze River Delta to build a unified technology market so as to solve the problem resulted from regional restriction, to strengthen technology information communication across cities and achieve information sharing in whole metropolitan region. At the same time, the agents' function of linking transaction between different cities needs consolidation and searching cost is lowered in different cities. In addition, law and regulation system should be perfected to standardize behavior of all players in the market and protect interests of all.

In view of this, the model of unified metropolitan region technology market may be shown as Figure 1.

16 cities in the Yangtze River Delta are classified into three levels in this model. Broken lines show this classification.

We disport marketing environment into soft and hard. The soft environment refers to the factors regulating and restricting but not directly affecting technology transaction. The periphery policy environment in Fig. 1 refers to intellectual property protection, technology transaction regulation, behavior restriction on technology traders and related legislation. Perfect system of legislation and regulation is a very important part of technology market environment and will affect the construction and operation of the unified technology market. The hard environment refers the factors, beyond both buyer and seller of technology and their behavior, which working on technology transaction directly. The gray ring, running through three levels of the unified technology market, represents information system of the market. It joins technology agencies, buyers and sellers and is the key to realize technology transaction across cities in the Yangtze River Delta.

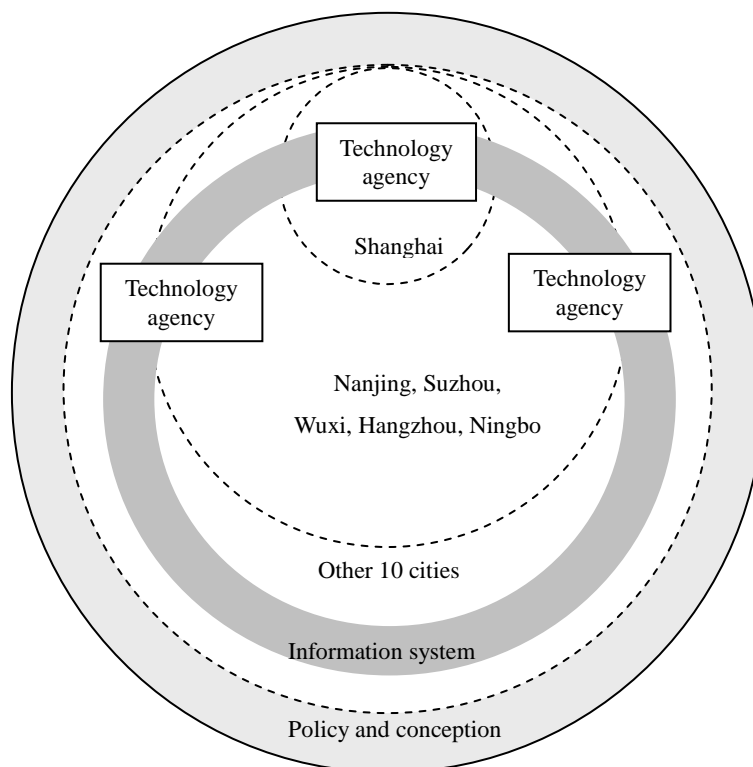


Figure1. Structural model of the unified metropolitan region technology market

Technology agencies are integrated by information system for facilitating technology transaction across different cities and lowering transaction cost. In order to reduce impact of converse selection of technology transaction and increase quality of technology agent service and level of specialization, it is necessary to build special agencies providing professional technological inspection, evaluation and consultation. Some common agencies are also needed for information supply. Special agencies are mainly set up in the cities of first and

second levels. All these agencies form an integrated network of technology transaction service.

OPERATION MECHANISM OF THE UNIFIED METROPOLITAN REGION TECHNOLOGY MARKET

The model of unified metropolitan region technology market contains market environment, players of technology transaction and combining mode of all factors in the metropolitan region. Based on the model, this paper will further discuss how it operates, including how policy environment acts, how technology agencies provide service, how to share transaction information, how the market is supervised.

Behavior restraining mechanism on players of technology transaction

Being differ from common commodities, technology bears many unique characteristics such as information dissymmetry, uncertainty of technology value, hard observation on both buyers and sellers. These factors may lead to moral risk or opportunism, increase difficulty for implementing contract. Therefore it is necessary to create a promoting and restraining mechanism in favor of implementing technology contract. Here we design a combining of formal and informal restraints.

1. Formal restraint

Formal restraint generally refers to justice, economic regulation and contract. Formal restraint has authoritative and forced function on implementation of technology contract. In fact, efficient and formal regulation and its actualization is the basic precondition for carrying on contract.

2. Informal restraint

Informal restraint refers to the informal or unwritten part in social system, mainly behavior criterion and rule, custom and so forth. It has been pointed out that efficient and formal regulation and system is the base and precondition for implementing technology contract. But information dissymmetry and uncertainty in technology transaction severely limit or restrict the function of formal restraint. Formal restraint only provides a good system background and environment for coming to an agreement and its implementation, and that efficient informal restraint is the key for contract implementing.

Technology contract is typically incomplete. Most incomplete contracts are self-implementary. The self-implementary mechanism of incomplete contract implies that parties of a contract make use of their own advantage and special relative investment impose punishment other than noncompulsory articles on the observable parties who think of breach of faith. This punishment articles mainly contains two aspects: direct loss resulted from ending of party relationship and related loss induced from depreciation of credit standing. This depreciation may increase cost of breaching party in future transaction. Unified information system may make credit depreciation of breaching party spread in whole metropolitan region and thereafter his communication and cooperation network be damaged.

As a result, informal restraint in unified metropolitan region technology market possesses strong influence on contract implementation and strong restriction on behavior of players of technology transaction in a metropolitan region.

Organizing mechanism of technology agency

Technology agency plays an important role in reducing technology transaction cost, improving transaction rate and implementing efficiency. There are many technology agencies of different operating modes and being lack of concurrent serving criterion. On the one hand, prosperity of technology agency promotes technology transaction and enhances transaction volume in the Yangtze River Delta. On the other hand, however, due to the characteristics of technology transaction stated above, implementation of technology contract is hard to control. Many contracts stop just after contract signing because there lacks reasonable mechanism and controlling measures. Due to the characteristics of crossing administration borders and huge information in the metropolitan region, technology agency should shoulder tasks such as information communication, transaction matching, standardizing transaction course, contract consulting and supervising complementation. It is therefore required to optimize existing resource of technology agencies and construct new agent mode fitting unified metropolitan region technology market.

1. Vertical integrated technology agent service

The new mode of technology agent service should cover functions of information service, technology consulting, evaluation, legal service, technology training and supervision. The mode may show in Figure 2.

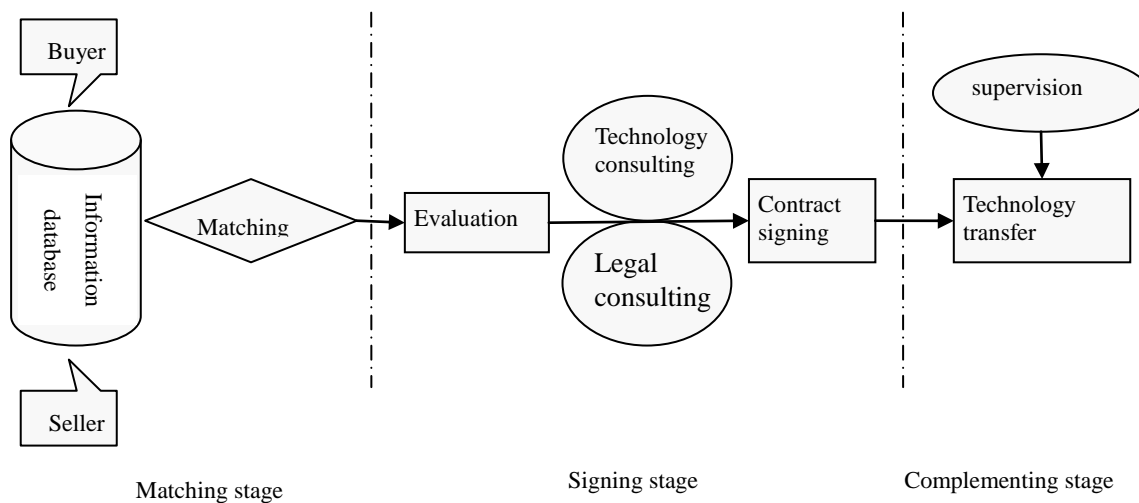


Figure 2. Vertical integrated technology agent service

Firstly, one part needs technology information may put information in a technology agent organization and then the organization put on records in information database. Agency searches matching part in the database thereafter. The key of success is unified information system. In stage two, technology agent organization evaluates technology provided on its

function, specialty, implementing condition, advanced grade and so on so as to judge the pricing rationality and give reference for contract signing. The functions of technology agency in consultation process helps buyer understand general information of technology as well as ensure seller's intellectual property right. For legal problems involved technology agency may give corresponding legal consulting, standardize illegal behavior and safeguard interests of both sides. After confirmation from lawyer and unanimity of both parties, technology contrast is underwritten under supervision of technology agency. At the following stage of implementation, key in technology transfer, technology agency may oversee seller provide necessary training and guidance according contract.

Operation of the new technology agent organization comes down to many special service such as information system, technology evaluation and legal issues, has completed organizational structure and function. So it needs support from government.

2. Professional technology agency and common technology agency

Professional technology agency refers to the one focusing on technology transaction in certain technological fields such as IT or medicine. Organization structure of vertical integrated technology agency complicated functionally. This kind of agency may provide integrated service in technology transaction, needs mass human resource and special equipment, and then hardly covers all technological areas. In order to decrease searching cost of both sides and enhance their trading enthusiasm, it is better to set up agencies according to technological fields. Furthermore, according to industrial chain and industrial development in the Yangtze River Delta, to establish some professional technology agencies in cities at first and second levels. Agencies in cities at the third level mainly take charge of information collection and matching. All these technology agencies should be integrated and distributed reasonably in the light of economic, technological and regional development (Figure 3).

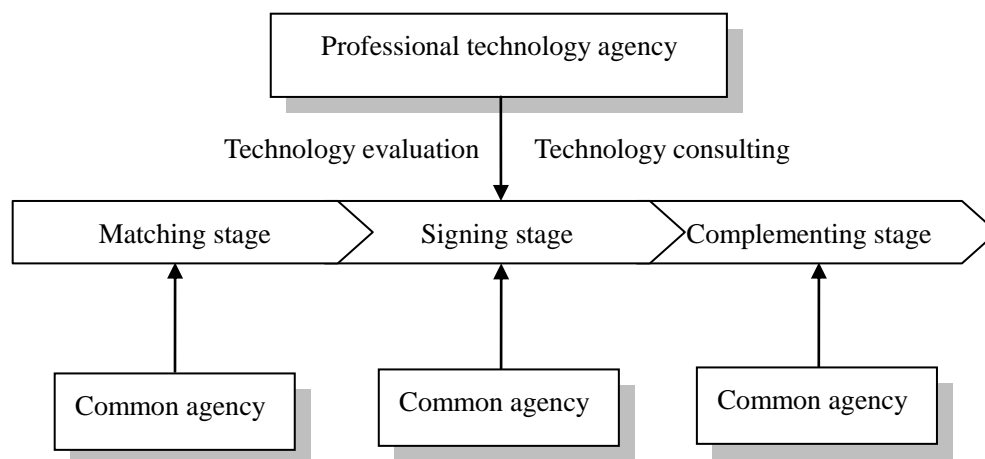


Figure 3. Cooperation between professional and common technology Agencies

3. Horizontally integrated technology agent service

Horizontally integrated technology agent service emphasizes to integrate all technology agencies in the metropolitan region through information system of technology transaction, division and cooperation of agent service, interest distribution mechanism. Horizontal union is obligatory when providing vertical integrated service. At the same time, horizontal

integrated agent service may shun distortion resulted from competition of the same trade and then.

When transaction parties of specialized technology field locate in different cities and technology transfer involves both professional and common agencies, process modularization of integrated technology agent service is necessary. According to characteristics of technology transaction, service may be classified to process service and transaction consulting service. Process service mainly contains transaction matching, legal consulting, checkup of technology contract, supervising seller's implementing and the like. In the condition of information system and related legal steps being complete, most agencies can furnish the above serving items. Technology transaction consulting involves specialized knowledge and therefore needs third party who understands both technology and market and participates in technology evaluation and professional guidance. This service needs professional technician and detecting equipment and then should be completed by professional agencies.

Operational mechanism of unified information system

Unified information system of technology transaction is the important part for building unified metropolitan region technology market. It has functions of coupling, sharing, recoding and supervising in technology information sharing crossing cities, information matching and cooperation among different agencies in different cities.

At present, the Yangtze River Delta has established an elementary technology transaction system on web such as Shanghai Technology Transaction Web, publishing some technology information. Technology traders may search related information on it. But its function is limited today. It is required for the Yangtze River Delta to change serving mode. The construction of unified technology agent service system needs an information system which can couple all agencies in the metropolitan region and provide complete service for cooperation between agencies. However, current information system has a long way to go to achieve this assumption. Unified technology market needs to integrate current resources of information system including hardware infrastructure, web environment, information resources, and most importantly needs new operating mechanism with new systematic function.

The function of unified information system may work through the following mechanisms.

1. Information issuing mechanism

The parties involving technology transaction may report related information of supply and demand to some agency. The technology agency then standardizes technology information and records it in information system including technological function and implementing condition. Besides information issuing, technology agency also takes charge of information maintenance.

Information issuing midwives self restraint mechanism of agent system. Common agency needs distribute income in cooperation with professional agency. If a common agency provides inferior service the information issuing mechanism may make other professional agencies become conscious of this behavior and accordingly make supervising organization implement punishment on the common agency. In addition, the information system only lays

out information summary after information issuing. If one party is interested in it, he may further communicate with technology agency and get detailed information. Doing so, intellectual property or business secret may obtain protection and at the same time interest of technology agency gets maintenance, and especially some violating behavior due to transacting between different cities may be avoided.

2. Transaction searching mechanism

Technology transaction information system is not only a platform of information issuing and revelation, but also an index of recording and searches. Recording function is completed automatically, gives an approach for searching technology transaction information and simultaneously from one important way of market supervision. Completed transaction information may be by way of checking afterwards. Supervision organization analyzes recorded information of technology transaction, agent participation and implementation by sampling and checks transaction validity so as to form restriction on transaction behavior.

Market supervising mechanism

Due to the metropolitan region breaches borders of administration districts, the unified technology of course breaks through supervising scope of local government on technology transaction. So it is necessary to build unified supervising organization crossing administration districts in order to afford unified supervision on technology transaction. This organization should be set up together by 16 cities in the metropolitan region and is authoritative and independent to local governments. Its function mainly is to supervise transaction validity and to intercede.

In performance, this organization mainly goes through supervision beforehand, medially and afterwards.

1. Supervising beforehand. Beforehand supervision mainly processes through transaction data checkup. Technology agency firstly sends transaction data to the supervision organization, including transaction item, transaction way and service needed. This information is mainly used for medial controlling. Considering timeliness and restraint force of supervision, transaction may, needless of approval from the organization, go forwards. Supervision organization interferes only when finding problems.

2. Supervising medially. Supervision organization checks technology transaction by sampling. Based on data provided, supervision organization checks authenticity of information and understands transaction process through communicating with agency and related parties. The aim is to carry on controlling medially.

3. Supervising afterwards. Supervision organization forms another restriction on transaction behavior through sampling transaction information recorded in information system. The organization has a complete working mechanism of disputing acceptance, recording, verdict and feedback, and provides for further edit and perfection of regulation and policy.

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