

# INNOVATION DEVELOPMENT

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## Regional innovation system construction and deepening reformation

*The article considers the stages of formation of innovation systems in China's regions. It presents the current condition of these systems and the specifics of their present and future development. The topical issues concerning the improvement of innovation development management at the regional level are highlighted.*

*Regional innovation systems, innovation potential of China's regions, its management, balanced development.*



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Like the generation of a regional innovation system theory, the generation of a regional innovation system is also a process of evolution and accumulation. Although, China's regional innovation system research sprang up from 1990s, the practical exploration started from the China's reform of opening in 1978. China's regional innovation system is developing with the deepening of reform, in other words, market economy system reform is the motive power of regional innovation system. Hence, the development of China's regional innovation system is an achievement from the 30-year unceasing exploration, reformation, innovation, practice and improvement.

**1. The evolution and feature of China's regional innovation system (figure).**

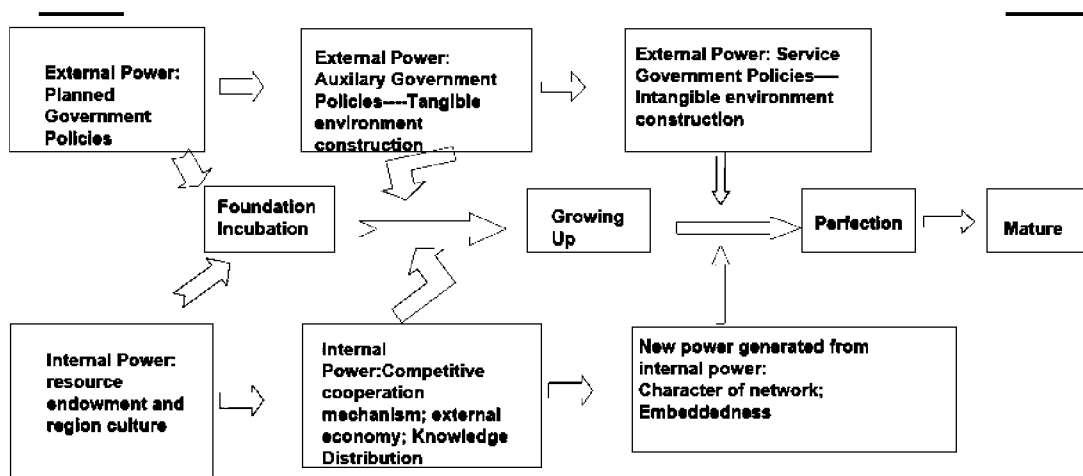
*Feature 1: Gradual model of regional innovation system development.*

As is well known, China's reforms are carried out gradually, that is, China carries on transformation from planned economy to market economy, from seclusion to openness, advancing orderly with multi-stage and steps. Therefore, China's regional innovation system construction process also shows the feature of advancing gradually and can be divided into the following phases: [1]

**I. 1978–1984: the foundation incubation process of regional innovation system.**

Marked by the convening of the Third Plenary Session of the 11th Central Committee of the Chinese Communist Party in 1978, China started its process in advancing reform and

Evolution power of every process in China's regional innovation system



opening up. Under the changes of macro-environment, some eastern regions started their practical explore in market-oriented reform. For instance, some small-scale and professional family workshops and small businesses sprang up rapidly in Zhejiang province. These businesses gathered together to survive and develop in the market and enhance technology by purchasing new equipments and imitating technological flows, which contributes to the rudiment of regional innovation system.

## II. 1985–1995: the growth process of regional innovation system.

With the continuous deepening of economic system reform and gradual establishment of market economy system, the external power and internal impetus of regional innovation system have transmitted from government independent promotion to common promotion of multiple market subjects gradually. Government function had conversion from direct participation to indirect participation. In that stage, 84 national new high-tech industrial development zones have been established in nation-wide, industrial cluster has become the concentrated reflection of the regional innovation system. The regional

innovation system started a virtuous circle of self-reinforcement and accomplished the evolution toward growth phase.

## III. Since 1996: the perfection process of regional innovation system.

Market economy and mechanism are gradually developing and perfecting. Service function of government has been consolidated. Market atmosphere of competitiveness and cooperation has been strengthened. Enterprises are paying more attention to collaboration and division of labor. Wider and more extensive cooperation will happen in industry-university-research cooperation. Capability of self-independent innovation of enterprises has been facilitated which accelerating the perfection and completion of regional innovation system.

### *Feature 2: Imbalance in regional innovation system construction.*

Since the reform and opening up, China is still focusing on plans to give priority on development to regions and fields, which is an unbalanced innovation development view. Hence, different regions and fields differentiated in development policy and resource endowment, resulting in the non-balance in regional innovation system construction.

**Regional distribution imbalance of innovation resource**

According to the relevant data, the indexes of scientific and technological activities, number of personnel, science and technology collection amount, patent application authorization number, oversea article research, technology market turnover and so forth are decreasing from East to West China, establishing an obvious pattern of three grades (East, Centre, West in region). Specifically, the Eastern region occupies 60%, the Centre occupies 20% while the West takes up 10%. In addition, Beijing and Shanghai and other international metropolises all locate in eastern China, highly concentrated in scientific resource and highly developed in science, which has become the “First World” in China’s scientific resource and development.

**(1) Unbalanced innovation capacity**

Lack of balance in scientific resource distribution has determined the unbalance in regional scientific innovation capacity to a large extent, which will be transmitted to scientific and social development field and make an extreme non-balance in regional economic development capacity.

With the perfection in economy market and mechanism, several regional “Innovation Poles” have established in China. Innovation system of city circles based on Pearl River Delta (Guangdong), Yangtze River Delta (Shanghai, Jiangsu and Zhejiang) and the Bohai rim (Beijing, Tianjin, Liaoning and Shandong) began to take shape and has become the “Innovation Highland” with stronger innovation capacity in China. Comparatively speaking, regional innovation system construction of middle and western China are developing in a slow pace.

*Feature 3: Difference in regional innovation system structure.*

Because Chinese reform is carrying out from rural to urban areas, from coastal area, riverside, border area to inland, from east to west gradually with regions differ in pace, pattern, degree of opening in reform and transformation, which lead to the differentiation in regional innovation system structure and present in several typical modes: Beijing Zhongguancun science park mode, Shanghai Zhangjiang Hi-Tech Park mode, Guangdong Shenzhen mode, etc.

Innovation capacity ranking change and index adjustment influence of all regions in 2012

Region	Rank of 2012	Rank of 2011	Variation	Region	Rank of 2012	Rank of 2011	Variation
Jiangsu	1	1	0	Inner Mongolia	17	21	4
Guangdong	2	2	0	Henan	18	17	-1
Beijing	3	3	0	Heilongjiang	19	20	1
Shanghai	4	4	0	Jiangxi	20	18	-2
Zhejiang	5	5	0	Hainan	21	27	6
Shandong	6	6	0	Guangxi	22	22	0
Tianjin	7	7	0	Guizhou	23	24	1
Liaoning	8	8	0	Jilin	24	16	-8
Anhui	9	15	6	Shanxi	25	23	-2
Hunan	10	11	1	Sinkiang	26	28	2
Hubei	11	13	2	Gansu	27	25	-2
Sichuan	12	9	-2	Yunnan	28	26	-2
Chongqing	13	10	-3	Qinghai	29	30	1
Shanxi	14	12	-2	Tibet	30	31	1
Hebei	15	19	4	Ningxia	31	29	-2
Fujian	16	14	-2				

Note: In the ranking changes, positive number refers the ranking is going up while negative number refers the ranking is going down.

**(1) Beijing Zhongguancun science park mode**

Beijing's regional innovation system is government-dominated and the government has become the subject of scientific research and development. The knowledge creative ability of Beijing has surged ahead of other regions and embodied its feature of rich resource in scientific education. For instance, Zhongguancun has "knowledge base" advantage by possessing Peking University, Tsinghua University and Chinese Academy of Sciences.

**(2) Shenzhen regional innovation system is market-dominated**

It is strong in scientific transform and application of scientific and technological achievements and formed a self-innovation system with enterprise as subject. Regional innovation principally relies on "External Introduction". Shenzhen has a good financing condition, a loose policy environment, advanced commercial awareness and thorough market mechanism, as well as the geographical location of adjoining to Hong Kong.

**(3) Shanghai regional innovation system is both market and government-dominated**

Shanghai takes its leading position in regional innovation capacity by virtue of outstanding commercial atmosphere, profound industrial foundation, innovation dominant role of enterprises as well as resource agglomeration capacity of Yangtze River Delta, and by its openness and internationalization.

In addition, Jiangsu and Tianjin's regional innovation system are also dominated by both market and government. They are up-rising stars in construction but with strong momentum in development. The creative capacity and environment of Jiangsu both rank first in China. On the one hand, it benefits from imperfection of market economy system.

On the other hand, it reflects that the favorable creative environment arouses the vigour of enterprise innovation [3].

**2. Experience and issues of China's regional innovation system**

We can get the following main experience from analyzing the evolution and feature of regional innovation system

**(1) Economic system transformation and reform is the institutional prerequisite of regional innovation system.** The key factor affecting regional innovation system construction lies in if there is a system and mechanism to arouse the passion to innovate. Along with the perfection of market economy system, regional innovation system is gradually improving. Hence, to achieve the reform goals including establishing a vigorous and forceful macroeconomic regulation and control system, setting up a market system with unity and openness, equal competition and sound rules, building mechanism of enterprise to adapt market economy request, facilitating pattern of ownership that diversified economy can coexist and enjoy joint development, installing and perfecting the social security system, etc, is the institutional prerequisite for the government to advance regional innovation and realize economic development.

**(2) The government plays a decisive role in regional innovation system construction.** In consideration of China, it is in a special period that both economy market and market system are defective. Governments at all levels are undertaking tough tasks of system innovation and are playing roles in system designing, resource mobilization, facilitating changes, benefit coordination and so forth. Hence, the construction and perfection of regional innovation system requires more from the government to act as a driving force and work better in coordination as well as provide better service in resource integration, coordination innovation subjects [4].

**(3) There is a direct proportionality between the development degree of regional innovation system and the strength of enterprise independent**

**innovation capability in intra-region.** With the perfection of function and operation mechanism in regional innovation system, it becomes more obvious in its promotion for the independent innovation capability of intra-region enterprises.

However, we can see a prominent problem from this:

A. Regional innovation system lacks top-level design. At present, most provinces and regions of China cultivate and construct regional innovation system respectively in accordance with its foundation and need. However, the state has less participation in regional innovation system cultivation and construction of provinces and regions, and plays insufficient role in nation-wide and general coordination and planning for functional orientation of them. This certainly will lead to the non-balance in innovation resource allocation between regions, structure duplication between different regional innovation systems, non-clearance in division of labor as well as slow in development by lacking of pertinent policy support.

B. Deviation exists in government functional orientation. During the process of building regional innovation system, government sometimes is used to direct and control in accordance with thinking and manner of the "plan". In the regional innovation system, the government works more but more participation is needed in macro-control, policy guidance and service function.

C. The enterprise status as technology innovation subject is ambiguous. Most enterprises are inactive in research and development, insufficient in innovation investment and imperfect in innovation organization mechanism, which impedes the formation and enhancement of enterprise self-independent innovation capacity.

D. Strong coordination mechanism and stable and long-acting cooperation in produc-

tion, study and research mechanism is of deficiency. Phenomena include barriers between higher and lower levels or between different departments and regions of scientific resources, segregation and repetition, mutual disconnection between science and economy still exist. Those will constraint the technological innovation and positivity of technological personnel in innovation and entrepreneurship, also, will affect the industrialization scientific and technological fruits [4].

### **3. Deepening reformation, constructing a balanced regional innovation system**

From a general view, China's regional innovation system is imperfect. A regional innovation system which not only meets the requirement of socialist market economy, but is also in line with scientific and technological innovation regulation should be established by deepening the reform and improving market system and mechanism.

#### **(1) Building a collaborated development mechanism between national innovation system and regional innovation system**

To establish an innovative country requires a national innovation system (NIS) with rational construction and efficient operation. In addition, the foundation of NIS is to establish a regional innovation system (RIS) full of vigor. Hence, in order to advance division of labor and interaction of NIS and RIS, the mode of "Local as subject, support from the state" should be taken and 2 motivation from the central and local should be given a full play. National innovation system focuses on technology with perspectiveness, fundamentality and generality as well as strategic high-technology. RIS puts emphasis on technology, R&D, promotion and application based on the actual demand of the region as well as establishes specialty industry relying on resource advantage of the region [5].

## **(2) Pushing forward the balanced development of regional innovation system**

Establishing and perfecting market mechanism compatible with scientific and technological innovation activities, fully taking use of market mechanism to strengthen the competitiveness and cooperation between enterprises and industries, establishing mutually-beneficial and win-win cooperation in cross-administrative regions and facilitating accessible flow of innovation resource factors; Building regional innovation system crossing administrative districts, enhancing the regional innovation capacity, and then boosting the harmonious development of region economy.

## **(3) Transferring the function of government and building innovation development environment**

Services for enterprises' innovation should be provided in aspects including regional research and development institution construction, regional infrastructure, technology innovation, talent training, enterprise financing, absorbing multinational corporation research center and other aspects. A sound environment and regulation should be provided for enterprise innovation in fiscal and taxation policies, intellectual property protection, system innovation and other aspects. A market environment with free and fair competition for enterprises should be built by maintaining the market

order, eliminating the function of policy barrier for entering or retreating from an industry.

## **(4) Building the system and mechanism of enterprise-oriented industrial technology research and innovation**

Further strengthening and improving politic measures; completing the incentive mechanism in inner-enterprise innovation and training mechanism of innovation talents; accelerating technological innovation system with enterprise as mainstay, market as orientation as well as close combination of production, study and research; facilitating enterprises to play role in organizing industrial technology R&D, implementing R&D innovation, investing in R&D, constructing innovation platform, integrating innovation talents, application of achievement transformation and owing intellectual property [6].

## **(5) Building financial system with innovative services and expanding innovative financing channels**

It is encouraged to develop venture investment, enhance equity transaction of all sorts of technologies and construct multi-level capital market to facilitate small-and-medium sized banks to provide innovative financing services for small-and-medium-sized enterprises and providing financial support in multiple aspects for regional innovation.

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