

## Review

# Fostering and developing the industry cluster vigorously in China in order to improve the technology-innovative capability of enterprises

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**As a form of an organization, enterprises play the fundamental role in the economic development around the world. Nowadays, many middle and small enterprises are with small market coverage, backwardness technology, low-level management, weak innovative capability as well as the slow rate of innovation. All of the above seriously hinders the improvement of the innovative capability. Thus, it is a strategic choice of the improvement of innovative capability for our middle and small enterprises to vigorously foster and develop the industry cluster and improve the competitive capability in view of the global value chain. In addition, it is also in accordance with the strategic requirement of building an innovative society as well as realizing a well-off society.**

**Key words:** Industry cluster, technology-innovative for SMEs, economies of scale, economy of scope.

## INTRODUCTION

Speeding up the process of economic globalization has led to worldwide economic, political, cultural, social and other aspects of major changes, SMEs are also the micro-economic agents facing unprecedented opportunities and challenges. To the fast-changing global market place in the increasingly fierce competition to gain the initiative, SMEs must have a strong ability in technological innovation, especially for independent innovation. Technological innovation capability of SMEs in China is still very weak, with independent intellectual property rights, independent brands, a lower proportion of high value-added products. According to statistics, China has only 1% of SMEs in the patent; there are only 25% of R&D institutions, R&D activities, only 30%. Industry Cluster can in fact cause a lot of industrial enterprises and is closely linked to universities, research institutes and other concentration in space, access to strong and continuous technical innovation, and thus much of the concern of scholars (Audretsch and Feldman, 1996; Beaudry and Swann, 2001).

In this paper, the global industrial value chain perspective is to explore how to develop local industrial clusters to enhance China's technological innovation capability of SMEs.

## INDUSTRIAL CLUSTERS TO ENHANCE TECHNOLOGICAL INNOVATION CAPABILITY OF SMES IN INTERNATIONAL EXPERIENCE

Technological innovation is the innovative businesses can use their own internal and external resources, through the formal channels to obtain a competitive advantage. Technological innovation can mainly be divided into two categories: the first category is graft-type, that is, the original technology-based through digestion, absorption and re-creation and other channels to form the core competitiveness of enterprises; second category is endogenous, research and development through the formation of major technological inventions, originality leading technology, including strategic innovation, the standard create, brand creation and so on, leading the entire industry value chain, decomposition and reconstruction, in the macro performance of the

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re-formation of a competitive pattern. Hsinchu, Taiwan, China and India, high-tech industry clusters Bangalore software industry cluster, a vivid illustration of the industrial clusters of SMEs in upgrading technological innovation capacity in a significant role.

### **Hsinchu, Taiwan, high-tech industrial clusters**

Hsinchu Science-Based Industrial Park, located southeast of Taiwan Hsinchu in 1976, started, officially established in December 1980, is Taiwan's first Science Park. Park use between enterprises within the cluster are geographically adjacent, closely linked to pass on the advantages of taking the vertical division of labor and resource sharing competitive strategies, making every enterprise is able to update their equipment, using new technology, through constant adjustment factor combination of inputs, reached a general improvement in business technology and total factor productivity purposes.

After 26 years of development, the Hsinchu Science based Industrial Park, not only in economic status, industry, and achieved total amount of attention to make the world's outstanding achievement in technological innovation and its capacity has been greatly expanded and accelerated to upgrade. In 1998, the Hsinchu Science based Industrial Park was selected as the world's fastest-growing top ten parks in the first place, was the U.S. "Business Week," called the "Asian Silicon Valley." Scientific research institutes, especially Industrial Technology Research Institute of the synergies and the participation of the Hsinchu Science-based Industrial Park, the use of high-tech industry cluster advantages of technological innovation to enhance the park in technological innovation capability of enterprises, enhance the technological content and products industry's international competitiveness.

In 2003, Hsinchu has a number of 3026 patents, more than in 2002 increased 12.6%. According to average, then, the Hsinchu Science based Industrial Park, each company will have eight patents, has a number of patents 29.7 per thousand per million dollars R&D outputs and the total number of patent 173, the high innovation potential of enterprises of more than Silicon Valley in the United States.

### **Software industry cluster in Bangalore, India**

Bangalore is located in southern India, is the capital of the southern Indian state of Karnataka. In June 1991, Bangalore, India established the nation's first computer software technology park. After less than 20 years of development, Bangalore is now the world's fifth largest information technology center in India's software. From 2004 to 2005, India's software exports 12.8 billion U.S. dollars, of which Bangalore exports amounted to

6.27 billion U.S. dollars, accounting for half of the entire Indian software exports. At present, Bangalore has formed a comprehensive business-centered R&D system and a sound technical innovation system. The reason is that a number of individual enterprises to use well-developed industry clusters within the network, re-human resources, scientific and technological achievements, knowledge, information and other factors of production to optimize the composition and configuration, enhancing technological innovation capability of enterprises. Thus, shown is no longer the simple sum of all individual enterprises formed the competitiveness, but rather a more global vision of the new cluster competitiveness. In the fierce global competition in computer software technology park in Bangalore, area businesses, rely on their different kind of technological innovation, not only defeated the Mumbai and other big cities, many well-known domestic companies, but also a number of global multinational companies trounced.

Hsinchu, Taiwan, China and India, Bangalore, these two examples of industry clusters, fully shows that the cluster would have saved a lot of SMEs in the brink of bankruptcy, not only to enable them to survive, but also enhance their overall competitive advantage.

### **INDUSTRIAL CLUSTERS ENHANCE THE ECONOMICS OF TECHNOLOGICAL INNOVATION CAPABILITY OF SMES INTERPRETATION**

As the business conduct of members of a cluster with a single enterprise than a more comprehensive, systematic and integrity, therefore, for industrial clusters to enhance the interpretation of technical innovation capability of SMEs, need a new perspective. In this paper, the basic theory of economics, through the three aspects of this be interpreted.

#### **To reduce the cost of business innovation and entrepreneurial risk**

The geographical concentration of enterprises within the cluster and interrelated, making the entire industry cluster is more refined division of labor, intermediate inputs and labor market size scale effect can also be fully effective. The link between enterprises within the cluster bond, including blood, marriage, or extended to fellow classmates, friends, mutual trust and commitment sufficient to maintain the specialized division of labor among enterprises and cooperative relations. Because a large number of companies concentrated in a limited geographic range of the latest achievements in technological innovation will soon be receiving other enterprises within the cluster, digestion, absorption and re-creation. They can be shared infrastructure, public

services and other organizations of the product, further reducing costs and business risks of innovation. Cluster refinement of the division of labor, lower the cost of innovation, but also create economies of scale, there is conducive to economic growth (Henderson, 1986). Figure 1 is the cost of enterprises to enter the cluster before and after the changes.

### **To promote enterprise technological progress and technology diffusion**

Technological advances rooted in technological innovation, technological innovation has come from technological innovation system. Industrial cluster is an important regional innovation system. Industry cluster not only has many different sizes and organizational forms of enterprises, and these enterprises are derived and reproduction. Many business owners are mostly concerned with the previous company, but the enterprise or the proposed development strategy is not being taken seriously, or to see the potential market, or the invention of new technology has been neglected by the old enterprises, etc., and thus to leave the old company which gather to Together, this can often lead to further innovation in technology and products. A large number of companies coming together to invent the technology will soon be absorbed by others and re-innovation, and, therefore, they have both a huge market pressure, as well as strong impulse to the development of, and actively carry out technological innovation. The advantages of industrial clusters between enterprises or between enterprises and the market interaction, that is, within the symbiotic existence of industrial clusters. Cluster formation of this interaction the pressure of competition, the potential pressure brought a series of technical innovation, promoting industrial upgrading to speed up. The communication between the external environment, communication and cooperation process, the company absorbed advanced technology and scarce resources, increased technology diffusion between the different clusters.

### **The accumulation of knowledge and expertise outside the enterprise**

Industrial cluster a large number of companies organized manner, relying on its own with the "flexible specialization", learning and innovation, cooperation and competition, self-organization and other features, is bound to produce clusters of enterprises and organizations outside the polarization effects (polarization), the relevant If the conditions of enterprises and organizations will relocate to the cluster (Wang, 2001). Some Chinese scholars also believe that by leveraging concentration of economic and competitive advantage, industry clusters reduces the average cost of every enterprise to improve the region's social capital has led to significant inflows of capital and

labor cluster area. In Bangalore, India, for example, which now attracts three Indian software companies INFOSYS, WIPRO and many multinational corporations such as International Business Machines Corporation, AT&T, Motorola Inc., Lucent Technologies, Microsoft and so on. These companies bring a lot of expertise and high-quality personnel, and further enrich the software technology parks in Bangalore, the technological strength and international competitiveness.

### **THE GLOBAL VALUE CHAIN TO IMPROVE THE PERSPECTIVE OF TECHNOLOGICAL INNOVATION CAPABILITY OF SMES IN CHINA'S STRATEGIC INITIATIVES**

Firm as an organizational form of the economic development of countries in the world plays a fundamental role. Both developed and emerging developing countries are actively fostering the development of enterprises, especially small and medium enterprises. Because China's small and medium enterprises without in-depth, systematic policy research, there is no unified government regulatory agencies, improved social service system, etc. as well as legislative and other issues behind, many SMEs are still unable to overcome the inherent deficiencies, such as market coverage narrow, technical equipment poor management skill, innovation is not strong, the slow pace of innovation and low added value, financing channels narrow. Thus, in the global industrial value chain of Perspective cultivate and develop industrial clusters to enhance their competitiveness, Naishi raise China's technological innovation capability of SMEs strategic choice.

### **Strengthen the government's rule-making in the market, industry guidance, information services, policy guidance, etc. functions**

Industrial cluster is between a pure market, and between the intermediate level of organization, than the market is stable and flexible than the hierarchical organization. Because information asymmetry, the interference of interest groups, functions missing bit (offside, dislocation, vacancy), etc., the Government's intervention may exist "efficiency trap" (efficiency trap), mainly for the distortion of market mechanisms to influence the market equilibrium, etc.. Targeted industry clusters with system flaws and market failures such as inadequate, Porter (2002) that the Government's role is to improve the constraints on cluster development, infrastructure construction and personnel training and education, rather than direct intervention in the cluster development. In Italy, due to excessive government interference had led to its once fell into the quagmire of industrial clusters is difficult to get away, and the sincerity of China's Zhejiang Province, Pinghu city

government led to the optical and electrical machinery investment "seed" enterprises, its professional services to facilitate the light mechanical and electrical cluster rapid growth. Therefore, China should actively participate in all levels of local governments, enthusiastic support, strengthening quality management, and promoting the formation of industrial clusters diversified product mix and market structure, attaches importance to and strengthen the business information services, encourage the development of industry associations, industry organizations give full play to the self - services, coordination and management role.

**To establish a sound risk investment mechanism, and form private capital as the main risk of multi-channel investment and financing system**

In 2006, the National Bureau of Statistics, Nanjing, Wuxi, Suzhou, Changzhou, four SMEs in the city of 160 special survey of independent innovation of enterprises found that 78% of the surveyed enterprises believe that the financing difficulties are the key issues impeding business innovation. A general lack of operating funds for SMEs in China, local finance is limited; banks have high-risk innovative enterprises generally adopt a "prudent loan-to" and other factors that have led companies unable to invest funds for the technological achievements of the industrialization and commercialization of new products. Venture Capital originated from the United States, because the coordination of venture capitalists, technology experts, investors relations to form a benefit-sharing, risk-sharing mechanism, much investment in high-tech enterprises welcome. Therefore, China should give full play to open a high degree of private capital, the advantages of more adequate to establish risk investment mechanism to encourage the international capital, private capital into the venture capital, private capital as the main body to form a multi-channel venture capital financing system for the enhance the competitiveness of industrial clusters to provide the necessary equity capital.

**Vigorously develop science and technology agency, improve the scientific and technological innovation service system, promote innovation and the integration of the elements**

Overseas experience has shown that intermediaries can take full advantage of the competitive edge and drive them to perfection and norms; a sense reflects the level of market development. The existence of intermediaries, such as technical information service centers, venture capital services, credit guarantee institutions, etc., greatly reducing the need for a variety of industrial clusters of information and knowledge, reducing transaction costs. Although the central government has developed a number

of normative intermediary structure, rules and regulations, but a small number of intermediaries, the structure a single, the lack of appropriate mechanisms to improve and regulate the problem has seriously hindered the exchange of information between industry clusters. Therefore, it should form a complete set of including science and technology achievements and technical advisory services, talent agency, management consulting, financial institutions, various rating agencies and information service institutions, and the provision of legal, financial management, and other intermediary agencies to provide information consultation, training, assessment, inspection, arbitration, and coordination of various intermediary services.

**We must strengthen the monitoring and management of the cluster is running the intensity and scientific forecasting and planning future development of the cluster**

According to product life-cycle theory, the development of industrial clusters through budding, growth, maturity and decline, and so on several stages. At each stage, industry clusters not only not the same as the number of firms, but is not fully consistent with the cluster development strategy. Therefore, we should local conditions, make the best use to rational planning of the clusters, increase the cluster policy, both internal and external governance and the cluster intensity, for example, in the industrial cluster in its infancy, should be enthusiastic support, the availability of funds and facilities infrastructure; in the growth stage, we should expand the scale of industrial clusters to form a close network system; in the mature stage, more attention in the global industrial value chain on the upgrading of competitiveness of industrial clusters, rather than blindly obsessed with the scale of expansion. Study of international best practices, and continuous monitoring of industrial clusters, and based on the trend of the development of industrial clusters rational planning and scientific forecasting future development of industrial clusters, to avoid lock-in effect (Lock-in), and by low competition (Race to the bottom), is the cultivation and development of industrial clusters to enhance the ability of independent innovation enterprises an important way.

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