

## Research on Foreign Innovative Countries and Their Revelations

### ETUDES SUR DES PAYS INNOVATEURS ET LES REVELATIONS POUR LA CHINE

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**Abstract:** Focused on the Chinese innovation, The paper researched on the typical experiences of foreign innovative countries and the revelations for china to build an innovative country. Firstly, the paper introduced the original theory of innovative country: Schumpeterian's innovation theory. Secondly, it expounded the theory connotation of innovative country from two levels of technological economics and institutional economics and described totally the representatives and their basic theories of innovative country. Furthermore, it summed up the inevitability into the times of innovation-oriented nation, and the basic connotation and characteristic of innovative country. On that basis, it studied characteristics of foreign typical innovative countries in different levels, including USA, Japan, South Korea, Finland, Sweden. Finally, According to the achievements and shortcomings of building an innovative country of China at past time and making recommendations of the construction with Chinese characteristics, such as innovative national policy, institution, environment and so on, the paper specified the concepts of 'innovative country', concluded by advocating strengthening of national level capacities to reveal seven levels as follows: speeding up the national innovation system and culturing the initiate innovation ability of enterprises; improving the system and building a innovational security policies system perfectly; strengthening coordination between the innovation main bodies and enhancing the overall efficiency of system innovation; making good use of global science and technology resources, and expanding the economy and technology cooperation with developed countries; strengthening personnel training and setting up a relaxed environment for employment; accelerating the integration and construction of regional innovation system and improving the operating efficiency; building an innovation culture and strengthening the innovation spirit training and the innovational sense cultivation.

**Key words:** Innovative Countries; Different Countries; Innovation Theory; Innovational Policy

**Résumé:** Cet article nous présente des recherches sur les expériences typiques des pays innovateurs étrangers et les révélations pour la Chine pour construire un nouveau

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modèle de pays innovateur. Dans un premier temps, on introduit la naissance de la théorie de pays innovateur, c'est-à-dire la théorie de l'innovation technique de Schumpeter; ensuite, on explique les connotations de la théorie de pays innovateur du point de vue de l'économie de technologie et de l'économie de politique en faisant une présentation complète et raffinée sur les personnages représentatifs étrangers et leurs opinions principales sur la théorie de pays innovateur ; et puis, on résume l'inévitabilité de l'entrée dans l'époque d'innovation, les connotations et les caractéristiques des pays innovateurs. A partir de cette base, on fait des études sur les caractéristiques de certains pays innovateurs typiques, par exemple les Etats-Unis, le Japon, la Corée du Sud, la Finlande et la Suède. Finalement, des révélations et des réflexions sur la construction d'un pays innovateur en Chine.

**Mots-Clés:** pays innovateur, pays différents; la théorie d'innovation; la politique d'innovation

## 1. INSTRUCTION

Firstly, The paper introduces the original innovation theory (Schumpeter's theory of innovation), the theory of technological innovation was combined with the one of institutional innovation, and then the national innovation came. Secondly, it shows the study of innovation of developed countries, such as the USA: government's intervention in innovation; Japan: Technological creation is the foundation; Finland: A model of transition of national strategy; South Korea: improvement of independent innovational capacity; Sweden: the country of knowledge and research leading. The key point in the paper was that it expounds the achievements and shortcomings (policy, research investment) of building an innovation country of China at past time and makes recommendations of the construction with Chinese characteristics, such as innovative national policy, institutional system, finance, environment and so on, comparing the experiences and studies of national innovation systems of the developed countries.

## 2. ORIGINAL THEORY: SCHUMPETER'S THEORY OF INNOVATION

Innovation theory originated from the theory of technological innovation raised by Schumpeter (1912). In economics, Schumpeter's greatest contribution to the theory is put forward innovation theory which used to explain economic development, economic growth and the law of economic cycle, which opens a new research path for this field. Its innovation theory can be summed up in the following areas:

1<sup>st</sup>. Innovation is defined as “factors of production combined anew by entrepreneurs”. It includes: introduce a new product or provide a new quality products; adopt a new production methods; open up a new market; access to raw materials or semi-finished products of a new supply source; implement a new organizational form, such as creating or breaking a monopoly. Innovative entrepreneurs take advantage of new technologies and new ways to increase efficiency, lower costs and prices by profit in a dynamic society. Innovation is always carried out by individuals. However, innovation activities of the profits obtained by encouraging others to emulate, to form the wave of innovation, which is to improve the productivity of society as a whole, on the progress of the society.

2<sup>nd</sup>. The main innovation is the “entrepreneurs”. Schumpeter called the achievement of “new combinations” as the “enterprise”, so the people who realize the “new combinations” as their profession is the “entrepreneurs”. As a result, the core functions of entrepreneurs are not the operation or management, but to carry out this “new combination.” or not. The group with vision, ability to understand business, entrepreneurship is called entrepreneurs and profit maximization is the source of

innovation, so the power of economic development, in the final analysis, is profit and entrepreneurship.

3<sup>rd</sup>. Schumpeter “innovation theory” explained the law of economic development and economic cycle, which held that the so-called economic development was the continuous achievement of new combinations in the whole capitalist society. Capitalism is a form or method in economic change, which is a process of creative destruction which innovates the economic structure inner constantly.<sup>2</sup> The introduction of innovation is without a hitch, but sometimes high or low, then a business cycle appeared. Schumpeter integrated the previous arguments and raised the idea of the three cycles allegation which exist in the history of capitalist development process at the same time, which were “Nagiyev, N. Cycle” “Juglar cycle” and “Kitchen cycle”.

Schumpeter's innovation theory is a combination of economic and technology. Although he emphasized the importance of technological innovation, he linked technology progress, entrepreneurs activities and social development, which put forward a good idea for the development of innovation theory. At present, Schumpeter's theory has a greater expansion effects in the west academic circles, and is valued highly by western scholars for the progress of science and technology.

### 3. THE ORIENTATION OF TECHNOLOGY ECONOMIC: DEVELOPMENT OF TECHNOLOGICAL INNOVATION THEORY

In 1985, Drucker (Peter F. Drucker) published his “innovation and entrepreneurship”. Drucker said the entrepreneurs spoken by him are innovators, and the so-called entrepreneurial spirit was the spirit of innovation. In that book, he considered innovation and entrepreneurship as organizational (need to be), objective mission and systematic work firstly. Meanwhile, managers must treat innovation and entrepreneurship as their work and responsibilities.

Drucker argued that innovation was an action which granted new ability of creating wealth to resources. There were two types: one was technological innovation, which help some kind of natural find new applications in nature and give it new economic value; another was social innovation. It made a new administration, management manner or management tools in economy and society to get great economic and social value in the attribution of resources.<sup>3</sup> Here the “innovation society” included the innovation system. Drucker's classification was the summation about the innovation theory after Schumpeter's division.

In fact, Solow (S.C.Solow) is on behalf of the new classical school of technological innovation, which agreed technological innovation was the endogenous variables of the economic growth and the basic factor of economic growth; appropriate government intervention would promote technological innovation greatly. In 1957, in his “technological progress and growth in the total function”, Solow made an empirical analysis about non-agricultural sector productivity developments between 1909 and 1949 in USA, and found the main contribution to the labor productivity were the technological progress during that period. As continued in-depth study of technological progress on economic growth, the new classical school also had launched a research about the role of government intervention in technological innovation, and they put forward that government should take finance, tax, law, as well as government procurement, and other means of indirect regulation and controlling to intervene technical innovation activities for promoting the role in enhancing technological progress during economic development, when the market supply and demand in areas became invalid in technological innovation or the distribution of resources of technological innovation could not meet the needs of economy and social development. The well-known Solow Model designed to cultivate the ratio of technological progress's contribution to the economic growth. The integration of scientific technology and economic process is

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<sup>2</sup> Joseph. (1990). *Alois.Schumpeter Economic Development Theory*. P. 290. HE Wei (Trans.). Beijing: Commercial Press.

<sup>3</sup> Drucker. (1990). *Innovation and Entrepreneurship*. P. 290. HE Wei (Trans.). Beijing: Commercial Press.

no longer a qualitative expression, but a form of quantitative identification. Romer (Romer, 1990) further considered that scientific technology was the economic growth of endogenous variable because “R&D was the source of technological progress, and introduced into economic activity.”<sup>4</sup> He put knowledges as an independent factor into a new economic growth model, and then the well-known Romer model formed.

Christopher Freeman (1987), a States economist, was the first man to do innovative research with technological innovation theory and system methods innovation and proposed a “national innovation system” in 1987. After studying Japanese economic development, he found that Japan adopted technological innovation-oriented in addition to innovation of organization system under lagging behind in technology, and only a few decades the country's economy has strong momentum of development to become an industrial power. That shows country plays an important role in promoting technological innovation. He firstly proposed the “national innovation systems” concept like that: “the net is organized by public and private departments; their activities and interaction promote, induce, change, and diffuse all kinds of new technology.”<sup>5</sup>

On the basis of Schumpeter’s evolution of technological innovation, Nelson and Winter (1982) put forward a evolution model of technological innovation, viewing “technological change was clearly a process of evolution”.<sup>6</sup> A system for the important role of technological innovation has been recognized by many economists, and Freeman and Nelson were the first ones studying on that question, although they explore the United States and Japan mainly, no doubt they gave a general analysis.

#### **4. INSTITUTIONAL ECONOMICS-ORIENTED: DEVELOPMENT OF THE INSTITUTIONAL INNOVATION THEORY**

As the new institutional economics developed on the basis of Coase’s transaction expense theory after 1990th and drew economists’ attention to the complexity of institutional structure with the product coordination, the factors which condition the market scale and affect were understood profoundly. Douglas. C. North (1971, 1990) built a framework for analyzing institutions and defined the institutions were “game rules in a society, or rather, they are some conditions for relationship determination.” He also believed that: in history, economic growth comes from the efficient institutional arrangements, rather than the traditional sense of capital accumulation, technological progress and other factors, which only was the performance of growing. “The institutional factors play a decisive role in the economic growth, rather than technical factors, and the efficient organization is the key to economic growth.” The driving force of institutional innovation is the comparison between expected return and expected cost. After that, many development economists absorbed and took advantage of the new institutional economics analysis, and believed effective economic organization and institutional arrangements played an irreplaceable role in promoting economic development. North said: “knowledge and technology inventory made the toplimit for people’s activities, but they can’t restrict people how to succeed in these limits. Political and economic organization structure determine the economic performances and the growth rate of knowledge and technology inventory.”<sup>7</sup> If it didn’t encourage innovation in economic activities, a society won’t achieve the economic growth. As referred to the role of culture, North pointed out that the cultural belief was the basic determinative factors for institution structure. Max Weber (1920), in “The Protestant Ethic and the Spirit of Capitalism”, said that the driving force of expansion in

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<sup>4</sup> ZHANG HeChuan-qi. (1999). *A National Innovation System*. P. 28. Beijing: Higher Education Press.

<sup>5</sup> Freeman. (1992). Japan: A new national innovation system? *Technological Progress and Economic Theory* (pp. 402-419). Economic Science Press.

<sup>6</sup> Nelson. (1992). The United States' supportion of a system of technological progress. In Dolse, etc. *Technological Progress and Economic Theory* (pp. 380-396). Beijing: Science Press.

<sup>7</sup> North. *Systems, Institutional Change and Economic Performance*. (1994). LIU Shouying (Trans.). Shanghai: Joint Publishing.

modern times capitalism is not the sources of the capital amount for capitalism activities, while the development of capital spirit was more important.<sup>8</sup> Regulations are determined by the culture instead of policy. The culture value emphasized by Weber was just the informal organization emphasized by North, culture plays a role in economic growth by affecting institution.

**Table 1. The cornerstone of the innovative country theory**

Representative	Representative work	Basic theory
Schumpeter	Economic development theory (1912) Capitalism, Socialism and Democracy	Innovation is a kind of endogenous and “revolutionary” changes during product process, a creative baffled, and means destruction at the same time; innovation must creates new value and the main part is “entrepreneurs”.
Peter F. Drucker	Innovation and Entrepreneurship (1985) Entrepreneurship and innovation: in a Time of Change Management Principles and Practice (1989)	Innovation is an action which gives the resources new ability to create wealth. There are two types: One is technological innovation, which finds new applications in nature for some natural and endows it with new economic value; the other is social innovation, which produces a new management department, methods or tools in economy and society for getting great economic and social value from the distribution of resources.
Robert Merton Solow	In the capital of the process of innovation: Schumpeter's theory comment (1951)	Technological innovation is the endogenous variables and basic factor of economic growth; appropriate government intervention would promote technological innovation greatly, and the well-known Solow model was established.
Christopher Freeman	Japan's policy on technical and economic performance (1987) Japan: a new national innovation system? (1988)	In 1987 he put forward the concept of national innovation system at first time, and summed up the four elements of national innovation system: government, business research and development, education and training, unique structure.
Nelson	The United States supports a system of technological progress (1987) National Innovation System: A Comparative Study (1993)	The system structure of technological innovation system constituted by the following: market system, patent system, the support of government's policies and programs for technological innovation, universities and in-house research, venture capital and encouragement system of innovation and cooperation. At the same time the two main features of technological innovation structure are complexity and evolving nature.
North	System, Institutional Change and Economic Performance (1990) Changes in the system and the U.S. economic performance (1971)	Institutional factors play a decisive role in the economic growth, rather than technical factors, and the efficiency organization is the key to economic growth. The driving force of institutional innovation system is the comparison between expected return and expected cost.
Michael Porter	Competitiveness of the national (1980) strategy for competitiveness (1985) competitive advantage (1990)	"Five forces of competition" - His outstanding idea is the method of analysis of the industry's structure; he put forward three general strategies in his the “competitive strategy” clearly, which has greater impact as his contribution.

<sup>8</sup>Weber, M. (1987). *The Protestant Ethic and the Spirit of Capitalism*. Xiao (Trans.). Joint Publishing.

Schulz (T.w.Sohultz, 1960) is the earlier economist who put institution into endogenous research. He raised the institutional function of the economic value and economic equilibrium theory for introducing institution to an important position in economic. After studying the differences between rich and poor countries, Mancur Olson (1982, 1996) argued that that differences were result in the differences of institution and quality of economic policy, and then he put forward the necessary for “a government of strengthening markets” institution.<sup>9</sup> Acemoglu, Johnson and Robinson (2004) conclude a general analytical frame for explaining the economic performance by use the political system and resource attribution as the constant and the endogenous political power of social interest groups as the intermediary, and in which they raised that economic institution was the fundament of the long-term economic growth<sup>10</sup>.

In the field of institution economics, the theory of competitive strategy came from Michael Porter (Michael Porter, 1992) is outstanding in the theory of innovation-oriented nation. In his “competitive strategy”, he put forward three general strategies clearly and analyzed why the country is rich or poor in his “The Competitive Advantage of Nations”, which an important factor is the country's value system that was called “diamond system” imaginatively. Porter pointed out that: “Different from the general theory focus on macro-conditions of economic growth and prosperity, his own analysis based on micro-economic development chiefly, and thought the macro-level was as important as micro-level.”<sup>11</sup> He emphasized the key role of micro-enterprises and industrial clusters in the national competition, and that is the theoretical framework for a competitive advantage which extracted from these microscopic studies with the regional and national level step by step, showed the mode of methodology top-down obviously. Generally speaking, Porter argued that government is not only in the role of industry participants to keep up with the pace of changes in the market, but also can not carry out the decision-making through distorting market. Porter held if a country in the well-off stage, it would decline sooner or later.

In short, Schumpeter's innovation theory and research was the initiative of the innovation study, and this new theory developed a new technological and institutional innovation theory. Solow's technological innovation theory reveals the processes and rules of the business innovation; the system economic theory raised by North reflects the irreplaceable role of political and economic organizations to economic development. The new growth theory as well as innovative models attempted to explain the effect of specialized knowledge and human capital on economic growth. The national innovation system theory from Kostov.Freeman expanded the fields of innovation theory, and Michael Porter's theory of national competitiveness further perfect the national innovation system theory. The main representative of innovation-oriented nation theory can be summed up in the following table (Table 1).

## **5. THE COMBINATION OF ECONOMY AND INSTITUTION: INTO THE TIMES OF INNOVATION-ORIENTED NATION**

In fact, the analysis of an innovation-oriented nation can be traced back to the “national system of production” theory of List(List, F,1841), the classical economist in German. In 1960s Schmookler (J.Schmookler,) focused on the relationship of technological innovation and economic growth, which stressed market demand is the decisive force in promoting technological innovation. Then Habermas (Habermas, 1962) referred to the view of the three-in-one with science, technology and industry, and stressed that the important role of state intervention institutionalization in promoting science and

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<sup>9</sup> Olson, M. Jr. Spring. (1996). Big bills left on the sidewalk: Why some countries are rich and others poor. *Journal of Economic Perspectives(U.S.)*, 10, 3-24.

<sup>10</sup> Daron, A. Johnson, S. and Robinson, J. A. (2004). Institutions as the fundamental cause of long-run growth. *NBER Working Paper*, No. w10481.

<sup>11</sup> Porter, M. (2007). LI Mingxuan and QIU Fumei (Trans.). *The Competitive Advantage of Nations*. p. 10. CITIC Press.

technology as the primary productive force, and his high-tech theory later formed the core of the national innovation theory. Lattanzi (Ruttan,1978) and Matthews (Matthews,1986) considered the relationship of institution and technology should be interdependent and mutually reinforcing in most cases, and one couldn't be separated from the other, even couldn't be considered as the decisive cause of economic arbitrarily. Nelson(Nelson,1987), thought the institution structure were formed by market system, patent system, the support of government's policies and programs for technological innovation, universities and in-house research, venture capital and encouragement system of innovation and cooperation after analyzing the institution structure for the technological innovation system in the United States,<sup>12</sup>and the two main features of technological innovation structure are complexity and evolving nature. After Freeman put forward the concept of the national innovation system, Nelson (Nelson,1993) emphasized sharing and cooperation among participants, and Landweaver (Lundvall,1992) emphasized the interactive learning, they developed the concept of a national innovation system further.<sup>13</sup> Pavitt and Patel (Patel and Pavitt, 1994) stressed the importance of national system, incentive structure and the competitiveness.<sup>14</sup>

One of the important performances of "Market failure" is that public product's supply isn't at Pareto optimality conditions, thus need the force outside market (such as state) intervene. The "market failure" theory proposes a simple standard which estimates whether the government intervene technology development and innovation properly. "Market failure" theory is the basis of the innovation comprehension, the contribution of innovation to economic development correctly, and the basic concern of government focusing on science, technology and innovational policy.<sup>15</sup>

Based on the study of transition countries economy, Stiglitz (Joseph E. Stiglitz, 1998) found the organization and social capital were important to economic growth in the course of economic development in addition to physical capital, human capital and intellectual capital, which include various forms of social capital, organizational capital, as well as the institution and relationship such as the formation of values, regulating trades, settling the disputes.<sup>16</sup> LIN Yifu (2005) agreed the institution choice was confined to the country's development strategy.<sup>17</sup>

HE Chuanqi, a researcher at the Chinese Academy of Sciences, though the development of a national innovation system could be divided into three phases: the phase of the national technological innovation system, the phase of the national innovation system, and the phase of the national knowledge innovation system. The national innovation system belonging to the knowledge-based economy emphasized the innovation and effective application of knowledge, and its basic was the theory of knowledge innovation and growth.<sup>18</sup> The basic characteristics of the knowledge economy are just the fundamental guarantee of an innovative country building.

The innovation-oriented nation is defined by the international academic community as: a country make scientific innovation as a fundamental strategy to substantially improve the scientific and technological innovational ability, and to form increasingly powerful competitive advantages. In today's world, the country's international competitiveness depends largely on the country's economic competitiveness, which depends on the ability of enterprises' innovation. The capability of a country innovation is composed of knowledge innovation, technological innovation, and institutional innovation. But a series of innovative capacities brought by culture, concepts, awareness such as institution innovation, policy innovation, organizational and management innovation was the basic guarantees and specific performances of a country competitiveness, and it also was the key connotations distinction

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<sup>12</sup> Nelson. (1992). The United States' support of a system of technological progress. In Dols, etc. *Technological Progress and Economic Theory* (pp. 380-396). Beijing: Science Press.

<sup>13</sup> Lundvall, B. A. (1992). *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Pinter Publisher.

<sup>14</sup> Patel, P. and Pavitt, K. (1998). National system of innovation under strain: The internalization of corporation R&D electronic working paper No.22, *Science Policy Research Unit Mantell Building*. University of Sussex.

<sup>15</sup> OECD. (1998). *New Rationale and Approaches in Technology and Innovation Policy, STI Review, No.22*. OECD, Paris.

<sup>16</sup> Stiglitz. (1998). "Economics" and the Short Case. p. 11. WANG Zeke (Trans.). Renmin University of China Press.

<sup>17</sup> LIN Yifu. (2005). *The Economic Development Strategy*. Peking University Press.

<sup>18</sup> HE Chuankai. (1999). *The Second Modernization*. pp. 9-10. Higher Education Press.

between the innovation-oriented nation and national innovation system. At present, there are 20 innovation-oriented nations admitted by the world, and the United States, Japan, Finland and South Korea included.

The basic characteristics of innovation-oriented nation can be summarized as:

1<sup>st</sup>. Innovation funds must meet a certain standards. At present, R&D investments in innovation-oriented nations are more than 2% in GNP. Take 2002 for example, Japan and the United States were 3.35% and 2.79% separately, while Sweden and Finland both were more than 3%.

2<sup>nd</sup>. Science and technology innovation must be the leading strategy in promoting the country development, and its composite index must be significantly higher than the other countries. At present, in the innovation-oriented nations, the contribution rates of science and technology have reached more than 70% generally.

3<sup>rd</sup>. Strong self-innovation capability. At present in innovation-oriented nations, the dependence on import of technologies are under 30%. For example, Finland and South Korea due to the use of initiate innovation, achieved the fundamental change in the mode of economic growth in 10 to 15 years.

4<sup>th</sup>. High outputs of innovation. The patents in the 20 innovative countries accepted universally account for 99% in the total, while the rich countries which the population is 15% of the world possesses nearly all of technical innovations.

## 6. CHARACTERISTIC STUDY OF THE INNOVATION-ORIENTED NATION

### 6.1 The USA: government intervenes the innovation

Based on market economy, the intervention of US government is limited, just was the amendments to the market results, and for the broader economic and non-economic objectives. Because of persisting in the cultural heritage of innovation, in addition to the political system suiting the free market properly, a variety of regulations and science and technology policies in place, the science and technology leadership headed by President, and the high inputs to education and R&D as well as the social environment system encouraging free thinking and self-innovation, which made the US become an powerful innovative technology country and own the most comprehensive national innovation system of the world.<sup>19</sup>

The basic characteristics and main advantages of the US national innovation system are following: paying attention to education and the introduction of talents from other countries, the input-output ratio of research funds on the leading level in the world, a national innovation system with government-industry-university-institute well-integrated, the affection of non-profit research institutions which completed to other three ones on science and technology development, a perfect institution of science and technology legislation, and a perfect capital market environment with high-tech industries services. Overall, the science and technology policy, from the pure one to the combination one with industrial policy, economic policy, and tax policy, then form a series innovation policy involves scientific and technical, economic, educational policy, and add new contents to science and technology innovation policy.<sup>20</sup>

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<sup>19</sup> WANG Law. (2003). *The New Economy (and Unreal Real Economic Power of the Revival of the Road)*. p. 4. Of the Central Party School Press.

<sup>20</sup> ZANG Feng and HE Chuankai. (1999). *A National Innovation System - A Modern Engine for the Second Time*, pp. 128-130. Higher Education Press.

## **6.2 Japan: Technology is the foundation**

Japan is the earlier country to refer to “education and technology build the nation”. Its national innovation system has gone through a process from technical innovation system to national innovation system. For absorbing advanced technology from the west to strengthen its own R & D, it became the world’s fastest-growing investment in research. By the 1990s, it had put forward “science and technological innovation build the nation”, and further increased investment in science and technology to perfect the national innovation system. According to the characteristics of the national conditions and searching for the optimal allocation of resources, Japan selected the right strategy and policy of innovation after the original copy and from low-tech to high-tech science successfully. That is the root cause of the rise of Japan.

## **6.3 Finland: A model of transition of national strategy**

Finland, a relatively backward country, has been a forest resource-based industry in Europe, while in recent years taking a road of innovative country realized the dream of development by leaps and bounds. From 1970s, the Finnish developed telecommunications’ industry to achieve strategic transition and economic take-off, and per capita gross national product is in a rapid growth and global competitiveness ranking jumped in the forefront. The government of Finland set up Finland’s Science and Technology Policy Committee chaired by the Prime Minister, Finnish Technology Development Center for providing advisory services and funding to researches and developments for enterprises, and established 10 enterprises to promote integration of science and technology park in the country. In Finland’s innovation system, the most striking advantage is the fast policy and short cycle. Innovative inputs has clear objectives, cooperation and coordination are parallel between the different departments rather than from the top-down or bottom-up system. Finland has developed a very dynamic system in the process, which not formed yet in the other Nordic countries. Government and corporate funds matching each other is one of the objectives, the Academy of Science in Finland provides an important external resources in the strategy.<sup>21</sup>

## **6.4. South Korea: perfect the innovational capacity continuously**

Starting industrialization up in the 50’s, Korean built and perfected their R&D system to promote economic growth gradually through the introduction, digestion and absorption, and the improvement of the advanced technologies from developed countries. On the base of absorbing advanced technologies widely, they enhance and cultivate the capability of independent innovation. After the 90’s, South Korea government mainly focus on the coordination of the relationship between innovation bodies, and make industry, education and research together to improve the overall efficiency.<sup>22</sup> Their government’s science and technology policy ideas can be summed up as: the strategy of science and technology development changed from tracking and imitating in the past to the creative-class ones, national R&D management system transformed from a distribution department in the past to a comprehensive coordination, the R&D development diverted from emphasizing on investment and expanding areas of research to improve the quality of scientific research industrialization. By introducing the competition, the national R&D system changed from government-funded research institutions mainly to the balance development of research, product and education. The core of innovational activities has been from the government-led mode to the business dominant one.

## **6.5. Sweden: the country with knowledge and research leading**

Sweden has been seen as a model in R&D world. Its characteristic is all the technical research needed were beard by academic community for the lack of strong research institutions. Sweden is striving to

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<sup>21</sup> Huogang Jiji Si. (2006). *Changes in the Nordic National Innovation System*. Intellectual Property Press.

<sup>22</sup> CHEN Chuang. (2007). History evolution of South Korea’s national innovation system. *China Youth Science and Technology*, 7.

become a knowledge and research leading country, and their innovation policy are achieved by the programs: technology and medicine, a good research environment and industry cooperation. Corporate R&D investment is as high as 78%, the commercialization of research is continue to increase, and the industry is international specially, which make government investment in research and development activities obscure.<sup>23</sup>

**Table 2. Typical characteristics of an innovation-oriented country**

	USA	JAPAN	South Korea	Finland	Sweden
National goals	Promote innovation and keep the leading role	Founded on science and technology innovation	Be the scientific research center of Asia-Pacific region and dominant some field of science and technology	Significantly strengthen the existing well-function innovation system and likely implement new changes further	to become country with knowledge and research leading
Constitution of system	Business, government research institutes and universities	Enterprises are the mainstay, and government officials involve in the research cooperation	Transform from government-led model to business-led model	R & D investment by enterprises as the mainstay	Large multinational companies as the main body, and lack of SMEs with innovation and growth
System Innovation	Create a good innovational environment through funding and science and the legislation of technology	Government investment, the cooperation system between research, officer and product of business innovation	The preferential policies to encourage enterprises innovation and establish a research review and assessment system	Innovative policies and political system are closely linked and the innovation system is stable	The core of industrial policy and research policy and lack of cooperation between government and enterprises
Technology Innovation	The perfect scientific reserch system and technological development ,small and medium enterprises become the force core.	Large R & D investment, sufficient capability research and development ,and the Government has an important role in guiding	The nation draw up the plan of major science and technology development and strengthen basic research	A clear target of innovational investment, corporate R & D investment as the mainstay, and the co-operation between government and business	R & D investment as the mainstay and prominent commercial operation of research

<sup>23</sup> Huogang Jiji Si. (2006). *Changes in the Nordic National Innovation System*. Intellectual Property Press.

## 7. AN INNOVATIVE COUNTRY IN CHINA CONSTRUCTION

Generally, although China has just reached GDP 1700\$ per capita, the overall index of science and technology innovation have been the equivalent to international GDP 5000 ~ 6000\$ per capita. China hopes to rely on their own efforts to make their research investments of the whole society will have risen to more than 2.5% in the gross domestic products ratio and R&D staff reached to more than 2,000,000 and dependence on foreign technology reduced to below 30% and international science Papers cited to the world's top 5 and the annual patents number been authorized to 60,000 into the world's top 3<sup>24</sup>, and strived to achieve an innovative country.

China's innovational status is large rather than strong, fast but not excellent; the core technology and the global value chain are controlled by others. In the 21st century, there were a better basis and many favorable factors for speeding up the development of science and technology. We will be encouraged of catching up fast when we understand and use our comprehensive advantages and identify gaps. "The changes are mainly from the preferential policy to institutional innovation-oriented, from a innovation of single and copy to the one of imitation combined with initiate innovation, from a single space scale expanding to the development of human resources"<sup>25</sup>

China's scientific and technological development has gone through a gradual penetration of understanding and the system improvement. From Mao Zedong "marching to the science", Deng Xiaoping "science and technology are the primary productive forces", Jiang Zemin "developing the country through science and education" to Hu Jintao "building an innovation-oriented nation", which make the country's scientific and technological development penetrate deeply step by step and referred to finally the high degree of national strategies, as well as the best interpretation of the "scientific concept of development". The construction and institutional arrangements of innovation-oriented nation have their own characteristics for the large differences of the national system, history, values and cultural factors. In fact, there is no optimal model of a national innovation system, which means that a national innovation system can not be imitated to a large extent, because the existence and the role of the exclusive national factors determine the national innovation system has its own unique department. Therefore, we can't copy the model of successful country. We should make an innovative country-led governments and civil-driven innovation system integrate effectively in further pushing forward to Chinese innovation, and establish an innovation system with the enterprises as mainstay and the effective flow of resources and integration.<sup>26</sup> The construction of national innovation system with Chinese characteristics is the product of science and technology progress combined with national traditions and culture.

### 7.1 Speeding up the national innovation system and culturing the initiate innovation ability of enterprises

The priority to build an innovation-oriented country is the construction of national innovation system. National innovation system is that "A set of relevant system arrangements about technical innovation cover all aspects of the national economy related to technological innovation including research and development activities, technology proliferation and appliance activities, activities related to financial

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<sup>24</sup> Medium and long-term national science and technology development planning framework (2006-2020). Xinhuanet .2005-12-31

<sup>25</sup> GU Shengzu. (2006). Six major strategies to promote the building of an innovation-oriented country. *Forum on China today*, 8, 20-21

<sup>26</sup> KONG Defang. (2008). A national innovation system should pay attention to non-governmental forces - An exclusive interview with Gu Shengzu an economist & vice chairman of the China Democratic National Construction Association. *Science and Technology Daily* (the 005<sup>th</sup> edition).

and policy support, as well as foreign exchange and cooperation activities.”<sup>27</sup> Building a national innovation system with Chinese characteristics must base on Chinese national conditions and the socialist market economy, sum up the successful experience of development abroad seriously, play the leading role of the government and the basic role of the market in science and technology allocation of resources, as well as the firm is as mainstay in technological innovation, and play the backbone and leading role of the national research institutes, the basic role and main force of the university fully, then enhance the combination of product-education-research, and form a complete and effective innovation value chain.<sup>28</sup>

The target of these arrangements is for enhancing the capability of initiate innovation, because “the core of building an innovation-oriented nation is to make enhance the capability of initiate innovation as a strategic point of science and technology development.” Since the reform and opening up, China’s science and technology development mainly have being depended on importing and absorbing from the West, but the practice proved it was impossible to introduce core technology, and the one couldn’t be introduced. “The 11th Five-Year plan” put forward: To establish technical innovation system with enterprises as the mainstay, market-oriented, research combined with product and education, and form a framework with initiate innovation. So we should increase the input of initiate innovation, and promote the “original innovation, integrated innovation and a new innovation after introduction, digestion and absorption.” We should fully mobilize the two forces of governments and civil and take two advantages that government leading innovation and civil promoting innovation, link science and technology parks and industrial clusters to create a favorable environment, encourage the entrepreneurship, then form a habit of initiate innovation, inspire all the people’s innovative initiative and continuously enhance the capability of initiate innovation.”<sup>29</sup>

## 7.2 Improving the system and building a innovational security policies system perfectly

To promote the building of the regional innovation system, it is necessary to make great efforts to do a good job in favor of innovation and policies systems, including the technical standards, risk management systems, intellectual property rights system, reward system, evaluation system and science and technology advisory and service system, tax system, and the distribution system and some others related to innovation directly, and the contract, personnel, employment system etc related to the improvement of market mechanism. In addition, the innovation system also includes social culture values, and the social culture of innovation bases on generally the venturesome spirit, the positive attitude of seizing the opportunities and mind-set of confidence to the future. Relative policies include the policy made by the nation to promote innovation directly, as well as education policy, income distribution, social security, employment policy and industrial policy, which are the indirect goal of innovations, but have ladge impact on innovation activities. Government should perfect related policies and regulations to prevent system down for the lack of system bug, and promote the market growth, all the related policies coordinating through the establishment of the system and laws, then provide a good policy environment for innovation.

The policies related with the initiate innovation can be summed up as fiscal, taxation, finance, industry as well as science and technology, but “policy analysis and research for promoting initiate innovation by nation” reported that “there are problems in policy system of the five categories as followed: First, the policy aim is unanimous, especially the objectives contradiction between economic policies and technologic policy; Second, supporting policies in science and technology innovation are ideas and lack of practical feasibilities; third, there is lack of effective supervision so that it is difficult to achieve policy results.” The presentation of the five areas is following:

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<sup>27</sup> WANG Chunfa. (2003). *The History Evolution and the Development Trend of Major Developed Countries' Innovation System*. Economic Science Press.

<sup>28</sup> LU Yongxiang. (2008). Be aware of major strategic significance of building an innovation-oriented country fully. *Science Times*, 1.

<sup>29</sup> GU Shengzu. A national innovation system should pay attention to non-governmental forces. *Science and Technology Daily*, 3.

### **7.2.1 Increasing financial input and innovation strategy guiding, the government shall be beard part of the innovational risk**

The country is attaching great importance to the financial investments of innovation all along, but actually, investments do not meet the basic requirements for lack of policy mandatory, for example, "The decision about accelerating science and technology progress CPC from Central Committee and the State Council" pointed out in 1995, "increasing the financial technology investment, and the growth rate of central and local financial technology should higher than the revenue growth rate every year." However, according to the estimations from 1996 to 2003, in half of the eight years the rate of financial investment in science and technology was much lower than the revenue growth rate. In recent years, from the proportion of science and technology funds accounting for national expenditure, the ratio is slipping overall.<sup>30</sup>

Observing R&D investment of an innovation-oriented nation in the world, we find that R&D investment accounting for 2%-3% of GDP, and have a rising trend year by year; in the R&D investment of enterprises, developed countries generally account for 3% of sales, while High-tech enterprises account for more than 5%. From 1991 to 2003, the R&D cost of China's large and medium-sized enterprises has always been accounting for 0.4%-0.8% of sales. Finland, the country of innovation leading, it's government funding on R&D investment are increasing by 7% annual year over the past 10 years, which means that Finland's R&D investment has been accounted for more than 3.5% of GDP, and the growth speed is still fast. Our technical target is that the contribution rate of science and technology to economic growth should rise from 39% to 60% and all R&D investments from 1.35% to 2.5%.<sup>31</sup> It was a relatively high proportion in developing countries, but still much lower than the developed ones. R&D input should be based on private investment and the state adopt a guiding strategy, which make the country shoulder part of innovational risk and companies may be able to invest more, at the same time stimulate innovative enthusiasm of enterprises, and enhance the innovation capability to achieve demonstration effects of country guiding innovation.

### **7.2.2 Adopting tax incentives policies to encourage enterprises' innovation in science and technology**

There are many drawbacks in Chinese current value added tax (VAT). Production VAT currently used in China is not favorable of lowering the tax burden of investment and promoting industrial restructuring and equipments upgrading, also not favorable of the development of capital and technology-intensive industries. Therefore, it is necessary to reform the tax system, establish financial and taxation policies of encouraging innovative, take on preferential policy to new technology development and programs of product-education-research, reduce VAT of high-tech enterprises, and encourage innovation of technology-intensive enterprises. Australia exempted taxation by 125% to support business R&D; simultaneously it took a package plans of support, which focused on funding basic research development, commercialization and technology promotion activities, including the core patronage plans, additional and incentive R&D plans, and financial tax relief equal to 150% -200%,<sup>32</sup> which are worth learning and drawing.

### **7.2.3 Promoting financial supports of science and technology innovation to raise special funds for science and technology development**

Financial policies promoting science and technology innovation tackle venture capital of innovation and

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<sup>30</sup> The heart of the two major issues of building an innovation-oriented country is money and the key is human resource. *Oriental Outlook*, 2006-01-17

<sup>31</sup> "Long-term national science and technology development planning framework (2006-2020)"

<sup>32</sup> YU Liegui. (2004). *To Build the Future - Australia Innovation System and Industrial Policies*. Publishing House of China's Economy.

finances of small and medium-sized enterprises (SME). SMEs, especially private enterprises are the most active groups but vulnerable ones in financial in innovation of national science and technology innovation system. Since 1980 the relevant state ministries and commissions have issued "National Technological Transformation Plan" and another 12 plans for the IT firms, but they mainly direct at state-owned large and medium-sized enterprises while private enterprises, SMEs are supported lower. The United States attaches great importance to innovation in small business, such as the United States Programs of Small Business Innovation Research provides 2.5% research funding of as the venture capital for small business innovation. We should nurture venture capital mechanism, establish the venture capital system of government leading and private investment as the main body, and increase support for SME and raise special funds to the develop science and technology on the basic of government financing and venture capital, at the same time make good use of private capital, perfect the introduction and withdrawal mechanism of venture capital, and increase the investment of intermediary service organizations with technological innovation and basic infrastructure of national technological innovation for enterprises technology innovation.

#### **7.2.4 Adjusting the industrial policies and making rational resource allocation**

Since the 30 years' reform and opening up, the industrial development of our country is unbalanced and resources allocation is unreasonable. "At present in the economy of developed countries, the economic paradigm is during the transitional period from the second generation industrial system of car and electrical-based to the one based on information technology and biotechnology, so knowledge-based economy will replace industrial economy."<sup>33</sup> Our industrial structure is major in expansion and development of the second generation industrial system coexisting with the third one, and the Government locates the resources, promote industrial clusters, enterprise networking to push the technical innovation and renewal of personnel. We should value the "demand-driven" researches, according to the OECD survey, 85% of all the world's R&D are ones, even though the 15% basic research are the "problem-oriented and demand-motivated."<sup>34</sup> In the industrial structure adjustment, we should speed up the upgrade and remodels, pay attention to the growth and development of knowledge industry, and perfect a good innovation environment when we incline to the high-tech industry and information technology industries.

#### **7.2.5 Transforming government functions and increasing the manage capacity of science and technology**

The establishment and promotion of science and technology policies and regulations system mean that the government functions of scientific and technological work must change accordingly and make more use of science and technology policies and regulations, no matter it is research and development, fruit transformation, or innovation of science and technology, protection of intellectual property, as long as the content related to scientific and technological activities, it is must carried out in the framework of policies and regulations. That is as the applied ability in the department of technical management were the stronger, the faster the competitiveness will be improved. Therefore, to strengthen cooperation among product, education and research, and transform intellectual into practical productive forces effectively, it need to perfect the industrial policy, strengthen the compulsory of implementation of science and technology policies, unveil more fresh policy, and less the qualitative development rules. For example, although "the decision of speeding up science and technology progresses" in 1995 put forward clearly the whole society R&D expenses would have accounted for 1.5% of the gross domestic product by 2000, the results from the implementation of the policy still has not reached 1.5% till 2004.

In addition, government procurement is also an effective science and technology policy in developing countries for encouraging independent innovation. "Government procurement is an important policy tool to affect direction and speed of innovation, which can reduce the risk to enter the

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<sup>33</sup> WANG Chunfa. (2002). *A National Innovation System and the Prospects for Economic Growth in East Asia*. China Social Sciences Publishing House.

<sup>34</sup> Huogang Jiji Si. (2006). *Changes in the Nordic National Innovation System*. Intellectual Property Press.

market effectively for innovational enterprises.”<sup>35</sup> Government procurement promotes technological innovation, product innovation and industrial structure upgrading, which is common ways in developed countries. China's government procurement is characterized by large, cheap, and poor quality. According to statistical data analysis of centralized purchasing list and procurement number, although the current “national” or “domestic” goods procured by government account for 90% more of the total, the majority limited to day-to-day supplies of low-end, which did not reflect the trend of the high-tech industry. Government procurement shouldn't be in the purpose of saving money simply, but should reflect how to promote initiate innovation and encourage the R&D investment of enterprises.

### **7.3 Strengthening coordination between the innovation main bodies and enhancing the overall efficiency of system innovation**

National innovation system is divided into four parts by OECD: business, universities and research institutes, government departments and intermediary institution (Figure1). Practices have proved that it is not necessary when increasing investment in R&D only to increase the country's economic strength, but the importance is the handling relationship of knowledge production, the transference and application, which is the relationship of the main bodies of innovational systems. The coordinated developments among the main innovation parts are realized by the flows of knowledge, which are divided into the basal knowledge and application knowledge, and only when the former across the “Dead Valley”<sup>36</sup> into the latter, then the new products could be introduce to the market through the R&D activities of enterprises. Therefore, the transformation and flowing of the knowledge inner the innovation system make innovation is not only the thing in enterprises, but make an innovation network involving governments, universities and research institutes, intermediary institutions, in which the government pays attention to nurture the innovation capability of the main bodies of national innovation system, coordinate the interaction between them simultaneously, and play a leading role in the direction of technological innovation and R&D investments.

After 90's the South Korea government “focus on coordinating the relationship between the main innovation parts, and link the product, education and research to improve the overall efficiency of innovation system.”<sup>37</sup> South Korean takes Science and Technology Park as an important tool of government coordination, which not only promotes joint research activities between large enterprises and research institutions, but strengthens the relations between university research activities and SMEs. OECD defined the meaning of cooperation and coordination between the main innovation parts in “National Innovation System” (2000) as “innovation is the result of complex interactions between the main parts and institutions. Technological change is not a perfect linear way but the result of an interaction and feedback between the elements of the system.” In Japanese R&D of “product-education-research” and technological innovation system, folk industry focus on research and development, the government emphasizes application research, and the universities pay attention to basic research in R&D, then form division of labor and coordination and interdependence pattern. Such practices strengthen the coordination among the main innovation parts and improve the overall efficiency of the innovation system.

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<sup>35</sup> FENG Zhijun. (2000). *Outline of a National Innovation System*. Shandong Education Press.

<sup>36</sup> Tokiwa wink. (2007). *Innovative Way the Innovational Culture of Japanese Manufacturing*. Intellectual Property Press.

<sup>37</sup> CHEN Chuang. (2007). The history evolution of South Korea's national innovation system. *China Youth Science and Technology*.

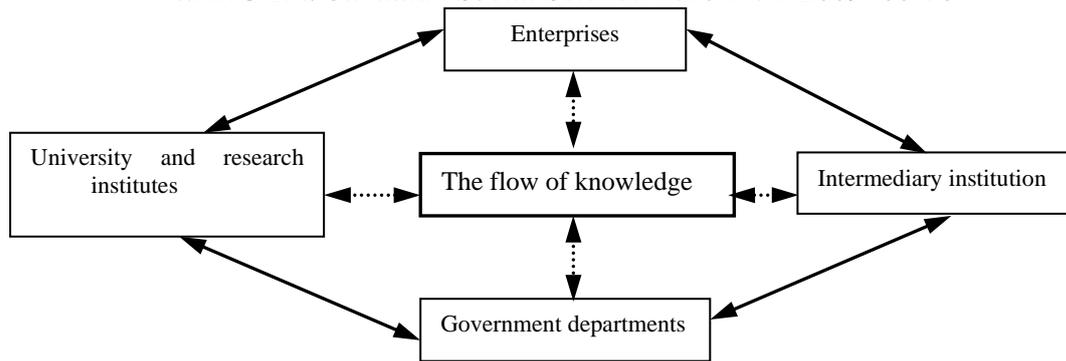


Figure 1. The constitution of OECD innovational systems

#### 7.4 Making good use of global science and technology resources, and expanding the economy and technology cooperation with developed countries

China is still “developing country of science and technology,” it will not work if we use our science and technology progresses and initiate innovation fully to realize the leap-forward development of science and technology, and initiate innovation is not innovate blindly with the door closing. We must cooperate in economical technology with developed countries painstakingly. On the basis of equality and mutual benefit with diverse effective forms, we should make good use of global science and technology resources, introduce advanced foreign technology unceasingly, carry out international and regional science and technology exchanges and cooperation actively, expand the areas of cooperation and deepen the level to improve the starting point of initiate innovation; promote intercourses between domestic enterprises and multinational companies continuously, speed up the transformation of advanced technology and management experiences among enterprises to promote the R&D level of domestic enterprises.

Japan and South Korea are worth studying in digestion and absorbing. “Japanese experiences showed that the starting point of catching up and technology across and the only effective way for the later country was introducing advanced technology from developed countries” and “the government chose development strategy of science and technology and policy orientation timely the correctly, which were copy firstly and then self-innovation, science first and then technology, civilian first and then military, the small and low technology first and then the big and high one.”<sup>38</sup> Due to the “community-oriented” innovation of Japan, so it had greater sensitivity in the market, the more using scientific technology which making the economy grow rapidly, then it improved and speeded up the digestion and absorbing of renew innovation mechanisms and did a good job with great effort, on the basis of which it did the second innovation and initiate innovation.

#### 7.5 Strengthening personnel training and setting up a relaxed environment for employment

Lu Zhiqiang, the former deputy director of State Council Development Research Center, pointed that the “double-track system” lead human resource (HR) limit and an imbalance structure; on the other hand, because the talent development is in a “transition” period, there is lack of talent development system for improving the enterprises’ competitiveness, and isn’t favorable for giving full play of the talents’s ability and value. Building an innovation-oriented country, the key is to enhance the capability of initiate innovation, which the key is talent. The talent training and appointment are as following aspects:

<sup>38</sup> WANG Chunfa. (2003). *The History Evolution and Development Trend of Major Developed National Innovation Systems*. Economic Science Press.

### **7.5.1 Changing the conception of training in mind**

It need talents of “scientists” type engaging in basic research and “entrepreneurs” type learning about establishing and safeguard a business for the building of innovation-oriented nation, as well as the ones with technical management who can transfer the research fruit into product needed by market and cross the “Dead Valley”. That really reflects the “people oriented” principle, and tries its best to create a relaxed environment for innovative people for playing their enthusiasm and initiative to create more and better results.

### **7.5.2 Changing the conservative and closed school system, and integrating the educational resources**

We should establish a union of product-education-research, and the talents “chain” training model with market-oriented and research-based, explore the new relationship actively of government, market and business in talents development, ground on the capability improvement of national innovation, build the corporate training mechanism of “government guidance, market allocation, corporate development”, and perfect education and training of personnel system to more talents come to the fore.

### **7.5.3 Attracting new talent through channels and improving the incentive mechanism**

Focus on the introduction of complex innovation talents to inject new vitality. At the same time, lay emphasis on the combination of training and introduction and establish a new mechanism with product, education and research in human capital to foster a group with skill and management. Simultaneously, take measures to perfect the incentive mechanism including the incentive of property rights, physical encourage, mental and other incentive measures to improve the social security system.

### **7.5.4 Accelerating the talent market building, and realizing the structure of human resources through macro-control and market-guide**

We should establish the operation and management mechanism of the talent market regulatory to improve information-sharing platform, transfer the orientation gradually from the government-led to government-guide and the market operation and build a first-rate talent market with first-rate talent by speeding up the management mode and mechanism in talent market.

## **7.6 Accelerating the integration and construction of regional innovation system and improving the operating efficiency**

Building an innovative country needs a high efficient national innovation system, compared with nation, region is more suitable for functional entity of studying innovation system, mainly because there are big differences between Chinese regional industry policies, economic development requirement and cultural environment, so cultivating a vibrant regional innovation system is the foundation of building a national innovation system. Regionalization has become a major feature of the world economy development, although the main innovation part is enterprise, the level of competition has risen from the enterprise level to the region one, so the competitiveness of enterprise is more depended on the whole environment of the region significantly.

During the regional innovation system process, it is necessary to highlight the regional characteristics and advantages, make great efforts to train and develop local industry clusters to form a new economic growth point and a new spatial pattern which take innovation and development as aims against features and advantages of different regional economy and science and technology development. On the basis of promoting the structure optimized of industrial clusters continuously and the prominent characteristics advantages, further enhance the ability of innovation, promote the development of regional advantages industry and improve the competitiveness of the industry continuously to create regional brands and bring up the regional innovation economy with regional characteristics. Therefore, to build an

innovation-oriented nation must begin building and integrating regional innovation system, studying the basic structure and function, and exploring the innovation environment fitting Chinese regional economy development, which can improve the operating of regional innovation system efficiency.

### **7.7 Building an innovation culture and strengthening the innovation spirit trainee and the innovational sense cultivation**

All of the innovation economy is rooted in the soil of the innovation culture. Amounts of researches show that there are different levels of economic development and abilities of innovation in different regions although these regions have the similar geographical environment, transportation, and resources endowment, some even have widening gap, which couldn't be explained by economic factor. Culture plays an important role in innovation capability. Innovation culture is a regional basic value in the long-term practice which is conducive to engage in or support the activities of technical innovation from economic entities of nation and region.

The United States is digesting and absorbing a wide range of different cultures to form a culture conception with "pragmatism" as the core, and the formation of innovational mechanism is benefiting from this cultural atmosphere of "freedom", "multielement" and "activity". Silicon Valley's success can't be separated from the innovation culture full of risk encouragement and failure tolerance. If lack of the courage to go ahead and the spirit of attempting, it will be difficult to carry out innovation, and be hard to create favorable public opinion environment for innovation and get out of the misunderstanding doctrine of satisfaction with its wealth, taking things as they are and abiding the mean. To foster advanced culture of innovation, we must carry forward the open-minded and enlightened cultural atmosphere, advocate the cultural spirit of "encourage competition and tolerate failure" actively, and strive to build an open cultural innovation system. "Only continuously digesting and absorbing a wide range of different cultures, then it will grow and innovate. Precisely the kinds of different cultures expand the vision of a society, and start a variety of possibility of development and innovation." Therefore innovation culture plays a key role in cultivating the spirit and sense of innovation, improving innovation capability continuously, and perfecting the innovative mechanism.

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