

## A Study on Implementation and Industrialization of Patent in Chinese Universities

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**Abstract** The performance and industrializing condition of patent in the college is analyzed, the reason of gap between the number of patent license in universities and the rate of industrialization is dissected, and countermeasures to promote the implementation and industrialization are proposed, by data analysis and logic reasoning. countermeasures include: positioning the status of college in the period of the implementation and industrialization accurately, improving the quality of the patents, setting up the bases, perfecting patent industrialization service agencies, strengthening cooperation among industries, universities and research institutes and the patent law.

**Key words** Universities patent; Industrialization; Independent innovation

### 1 Introduction

The implementation and industrialization of patent is the common management terms used by the universities and research institutions, enterprises and government departments. From the way of word-building and use, the term means that the personnel fulfilling the patent enforcement and industrialization of scientific research is to complete the job (including all kinds of subjects), or the patent application by making use of the school material and technical conditions, which emphasizes the use of the patent, and how to embody the patent competitiveness in the practice.

A university is the important part of the science and technology innovation system. As the important sign and reflection of the science and technology innovation, the patent is the important index that measures the scientific and technological level. With the increasing investment in national university, the number of the patent authorized has been obviously improved in recent years, many experiences have been accumulated in the implementation and industrialization of the patent, but there has still been so many problems existed that caused extensive concern of domestic scholars, the typical views are as follows:

Li Baifang had some opinions universities patent quality and patent industrialization rate, patent quality refers to the extent of the patent technology, it's not only the premise that embody the value of patent, but also the intrinsic reason whether patent can quickly industrialized. We must apply for high technology content patent to improve their quality oriented with the policy and quality. At the same time, the market is the key of patent industrialization, college patent should be aimed at the market demand, the combination of production, research to make patent development. (Li Baifang, on the own quality and market acceptance patent industrialization in the university, scientific advisory, 2009.7)

About the formula of college patent, Chen Kangmin, Lin Bin think, our college patent technology transformation model is an important factor of industrialization of achievement, the existing mode has four kinds, such as college-owned entities, collaborative entities, transformed by technical market, etc. College patent industrialization must take knowledge as capital to develop the science and technology industry of the school, avoid single achievements transformation pattern, Avoid the risk in the school technology industry development as far as possible, integrate the internal resources of the college, establish the multi-channel investment system, Establish university science and technology industry, escape mechanism of university science and technology achievement industrialization and intermediaries, cooperate with the government, enterprises, promote the construction of experimental base for supporting university-industry cooperation. (Chen Kangmin, Lin Bin. university science & technology industrialization in China, Achievements transformation pattern and industrialization of university science and technology in China, 2009.7)

About the countermeasures about college patent industrialization, Liu Xifa thought that we should adopt strengthening intellectual property protection and patent incentive policies, establish patent management institution, perfect patent service system and evaluation system of scientific and technological achievements. However, there are still some problems in the low industrialization rate, which needs further solution: service the local economy, promote the patent industrialization, promote the innovation of the patent, strengthen exchanges and promote rapid transformation of patent technology,

Build strategy system on its own. (Liu Xifa, the present situation and countermeasure of transformation of scientific and technological achievements in china, education Heilongjiang province, 2009.9)

About college patent industrialization issues, Chen Lanjie thought, we can see from the developed countries, technological development history, colleges and universities are the main base of national science and technology innovation and the development of national economy and many major breakthroughs relied on the university, so far, 70% of the major research that impact human life style was born in universities. To solve most of college patent technology transformation, practical problems is the thorny issues must be properly treated before us. (Chen Lanjie. Comparison on the transformation mode of scientific and technological achievements, industrial technology economy, 2009.3)

About the scientific research status of university, Dang Xiaomei, Zheng Yongping thought, university science research is the important power in science and technology, develop gradually the mainstay of basic research and applied research, and the important army of high-tech industrialization. In statistics of recent years, in national science and technology projects, such as science and technology, vol.10, national "863", "973" project plans, more than 30% and over 70% national natural science fund project are finished by the college, In the national science and technology prize winning project, more than 50% of the three award-winning program are rewarded by universities, about 70% of paper are published by the college. By the longitudinal and transverse analysis, comparison and statistics on the university science and technology development index, the university science and technology development status and overall strength has been clarified. (Dang Xiaomei, Zheng Yongping. Research and thinking on practices and development management in University patent work, 2007.4)

The thesis studied the essence of other researcher's works, quoted authority statistics from ministry of science and technology development center and the state intellectual property office, analysis the situation of patent in the university, put forward the ideas and countermeasures fit for characteristics and demands of college patent industrialization.

## 2 The Condition of the Industrialization of Patent in Universities

There are rich science and technology resources in the university, many R&D personnel and comparatively perfect research facilities. According to statistics, there are more than 60 million, researchers, 100 of state key laboratory, the 2/3, national high technology plan project in China. The university is the main power in the patent research and development, the department owned national research funding, scientific equipment and the most preferential policy, Universities have good research environment, have thousands of approved patent. In recent years, college patent license number is larger, as the following table:

**Table 1 The Number of Patent License in Universities Recent Three Years**

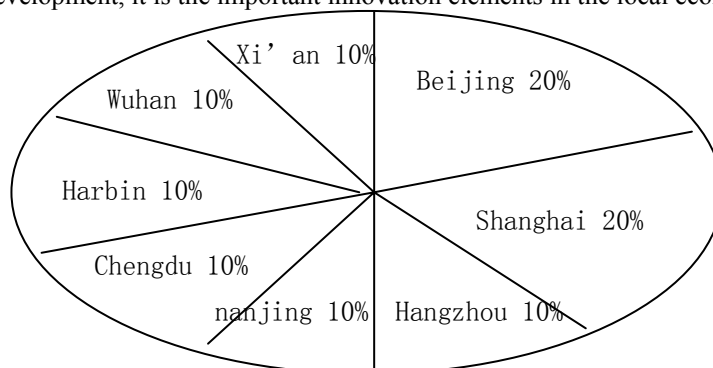
year	The number of Patent grant							
	total	Growth rate	invention	Growth rate	Utility	Growth rate	Appearance design	Growth rate
2006	10457	41.3%	6198	39.2%	3453	44.4%	806	45.2%
2007	14773	41.3%	8214	32.5%	5502	59.3%	1057	31.1%
2008	19159	29.7%	10265	25.0%	7242	31.6%	1652	56.3%
growth	78929	23.8%	40086	39.33%	34297	18.56%	4546	86.9%

The Data from Table 1 shows that there are many patent granted in the university in China in recent three years, in which over 75% are invention, it means that high concerns are paid to the protection of high technique innovation achievements and technology innovation achievements in the university, the knowledge and innovation ability assets university, this can bring the glory to the university, such as government rewards and substantial funding, university rankings, visibility ahead. Meanwhile, many of the invention patent, good scientific basis and condition, implement laid the base for the application and industrialization of college patent.

Data from Graph 1 shows that the top 10 universities that apply for a patent centered in Beijing, Shanghai, Zhejiang, because of high level of economic development in the three areas, industrial manufacturing output in 2007 China respectively, the third, the fourth and fifth<sup>1</sup>, regional economic competitiveness depends on enterprise competitiveness, and enterprise competitiveness depends on innovation ability of the enterprise, universities and research institutions can provide technical support.

<sup>1</sup> Ministry of industry and information consulting service center of electronic intellectual property. Chinese Electronics, 2009,11,20

Research data shows that there are direct interaction between college patent status and area technological innovation strength of ascension and the overall economic development. On one hand, the development of regional economy increases the high-end technology talented person's demand, improving college education resources development and research funds, promote technology innovation of the university, On the other hand, of college patent technology provides a new source of talent for local economic development, it is the important innovation elements in the local economic development.



**Figure 1 The Regional Distribution of the Top 10 Application for a Patent for Universities**

Data sources: Ministry of industry and information consulting service center of electronic intellectual property, 2009

In recent years, patent quantity increased year by year in Chinese universities,, but the quality of most patents are still poor, university college patent and the patent industrialization between provinces develop unbalanced, there are much differences in college patent industrialization. According to the national patent information in 2005, about 80% of patents are from scientific research institutes and universities, and as the main body of the research achievements, the industrialization rate is less than 10%<sup>1</sup>. According to a special investigation of Zhejiang university in 2009, in the recent years, college patent implementation rate of only 22.8%, the average of the whole country is about 30%, implementation rate of the university is below than that of the average level. The value of the patent is implemented, rather than the number of patent. There are various reasons exist in the low rate of patent application and industrialization.

#### (1) Self reason in the college patent

The patent value and value pursuit of college teachers have intersection and difference, both the number of paper and patent are assessment index for university teachers, “the university paid more energy on scientific research, except for a few will be sold out or have technology transformation, a large number of patent are in sleep and can't be activated.”<sup>2</sup> MaSongDe, Former vice minister of science department and researcher of ministry automation in science institute,said the number of application patent of university is 11.7% of the total but had almost no economic benefit, by contrast, American universities had only 4% patent application, but had 12% patent fee income, more than 10 billion dollars income<sup>3</sup>. Data shows that our college patent has weak competitiveness, which is less authorized by the enterprises of our country industrialization. By contrast, patent industrialization rate of enterprise is higher than that of the university. Tianjin Science and Technology University reported patent industrialization rate of Taida company patents is 55%, It is reported by Hubei Daily “The industrialization rate of Italian packaging machinery is 76%”, “patent industrialization rate of jiang is 30%.”<sup>4</sup> The reason of these is college patent development can't keep pace with the market, combining industrial enterprise research and development power with the market demand result in the industrialization, the development of products patent technology is certain to have good market.

#### (2) The loss of market mechanism

The general steps of Patent industrialization is: find market demand for products--R&D projects --financing-- marketing--complete of industrialization, The patent achievement in Chinese universities

<sup>1</sup> Liu Dan, Qiu Yi. <http://www.sina.com.cn>, 2005, 4, 20

<sup>2</sup> Liu Jian. College patent technology universal idle students to intellectual property rights become self-employed, Legal daily, 2009,5,26

<sup>3</sup> GuYang. Experts say China university of patent application little economic benefits. Guangming daily, 2008,10

<sup>4</sup> Li Baifang. The university of patent industrialization on their quality and market acceptance. Scientific consultation, The 7th in 2009

are transferred directly to enterprise or used in own enterprises. The reality is that most college patent technology is lack of information transmission and trading platform, can't be industrialized for lack of funds and practice.

(3) Limited communication between School and enterprise

The technical innovation must be realized by the enterprise, the alliance of combining production with research is the best way to implement the industrialization of college patent. At present, the main cooperation way between universities, research institutes, and the cooperation between enterprises is project, so there are many defects of short time and temporary, the barriers between enterprises failed to pull down, the long-term and stable community of interests between the parties failed to be established.

(4) The loss of college patent

According to the survey, it is a common phenomenon that the Chinese college patent technology loss a lot, the typical is the information like a trade secret can't be protected because the liable person take no privacy measures, the technology which should be applied for patent protection lose for the delay of achievements appraisal<sup>1</sup>. There are nearly 30% of the scientific and technological achievements in the University are stolen or lost because of staff loss, there are significant proportion of the teachers and technicians start companies or operate the school invention and transfer the invention to other company or let out the patent.

### 3 The Approach for Implementation and Industrialization of University Patents

“National long- term plan in science and technology development (2006-2020)” established the building of an innovation-oriented country, and put forward the strategic decision of proceeding into the innovative country by 2020<sup>2</sup>. In the national innovation system, college has an important strategic position, if college patent can not realize industrialization, it will discourage the enthusiasm for college patent application and strategic implementation. So it is necessary to consider favorable conditions of universities, and various approaches for promoting implementation and industrialization of the patents.

#### 3.1 Set up the base of patent industrialization

At present, there are several base named by government departments, supported and established by policies and laws involved in patent technology commercialization, industrialization base. Such as the “national patent industrialization project” pilot base set by the state intellectual property office organization, “863” project accomplishments industrialization base and the torch plan of characteristic industry base set by the Science and technology department, the local patent industrialization base established by intellectual property office and the technology department, plays an important role in promoting the transformation of patent scale achievements.

Usually, the college patent technology industrialization base can more readily make comprehensive results of industrialization, on one hand, by the central, systematical and large-scale transformation of the patent technology can improve enterprise scale industrial digestion and absorption capability and technical innovation ability, it will have the advantage in the fundamental industrialization, orderly risk industrialization, technology industrialization base operation than general patent industrialization. On the other hand, the patent that enter the patent industrialization base and the enterprise that guide the construction of college patent, have the advantages of producing high quality of independent patent fruits and promoting technological innovation subject growth because of its more continuous innovative power and enthusiasm. Therefore, we should combine the social production elements with the enterprise, taking the enterprise as the main body, orient with the market, realize base industrialization to attract risk investment expand cultivate brand in the market; to promote more scientific researcher to strengthen his transformation, drive with independent intellectual property rights group, introduce scientific research projects advantages into high-tech enterprise development strategy, improve industrialization of achievement of university science and technology innovation.

#### 3.2 Promote the alliance combining research with the production around college patent

Alliance of Combining research with the production is an organization composed of enterprises, institutions of higher learning and scientific research institutions based on the resource sharing, complementary advantages and business association, interests and the commitment to apportion constitute the basic research, development and application research on close cooperation organization. Patent enforcement is closely related with the enterprise management benefit, the focus should not only

<sup>1</sup> Song jian, Superior Intellectual Property Protection Connote Development of Regional Economy. Jiangsu Law, October 17, 2006

<sup>2</sup> State. The national long-term science and technology development plan outline (2006-2020)

is the pursuit of patent, and should center around the conversion of core technology, development, through the combination of patent protected, patent enforcement alliance and industrialization.

The union of research that combined with enterprise alliance is a kind of new market-oriented technology innovation system, and its realization is: to establish college patent technology incubation bases, realize industrialization application technology digestion and absorption and technical innovation ability, Establish universities, scientific research institutions and enterprises participate in the combination of forming complexes, complementary, Shared interests and risks of the running mechanism. During the process, the government should promote to build enterprise as the main body, give financial support and reward for universities and research institutes in the combination of formation complexes, complementary, Shared interests and risks of enterprise operation mechanism, and industry associations and higher school construction, cultivate and achieve higher level of production base, Combining production with research can provide the industrialization of intellectual property in colleges and universities, path produce-study-research transformation, and the patent output manufacture -learning-research cooperation and technical enterprise formed into base, the enterprise in transfer technical problems encountered in practical production, hire college patent technology experts, improving pertinence, promote the development of college patent output to qualitative change. It can Also provides support for the enterprise technological upgrading, new product development and training<sup>1</sup>. So it is an effective way to shorten the development cycle, the project's enterprise innovation ability and improve the level of innovation.

### **3.3 Improve intermediary services of patent industrialization**

Recently, many countries have taken effective measures to promote industrialization of college patent application, for example, in April 2009, state intellectual property office and the education department implement “patent information into common universities”, make broad popularization and application of patent in the university, promote the combination of scientific research, teaching activity and patent to promote the training of the compound talent having both professional skills and patent knowledge and promote the patent utilization consciousness of college teachers<sup>2</sup>.

In addition, it is necessary to establish patent technology broker career, perfect patent evaluation system, improve patent conversion service agencies. Cultivate the patent technology broker of trading and industrialization to improve and promote patent technology transformation establishment market by professional practice of intermediary service. Establish intellectual property appraisal institution includes patent assessment system and standard, construct standard and evaluation system of intellectual property evaluation expert, establish and perfect the intellectual property appraisal system. With the patent agencies and patent build for transformation of intermediary service certification, the establishment and implementation of patent industrialization service department, completes the patent agency, patent litigation, patent transformation, etc. promote college patent technology and information asymmetry and smooth by the intermediary service.

## **4 Relevant Countermeasures for Pushing Forward the Implementation and Industrialization of University Patents**

Patent enforcement and industrialization is a complicated system, it involves different stakeholders, government authorities, different industries and different operation modes, it is necessary to consider various conditions and factors, drive college patent reasonable exploitation and utilization and universities comprehensive development with appropriate countermeasures.

### **4.1 Position the status of university in the national innovation system accurately**

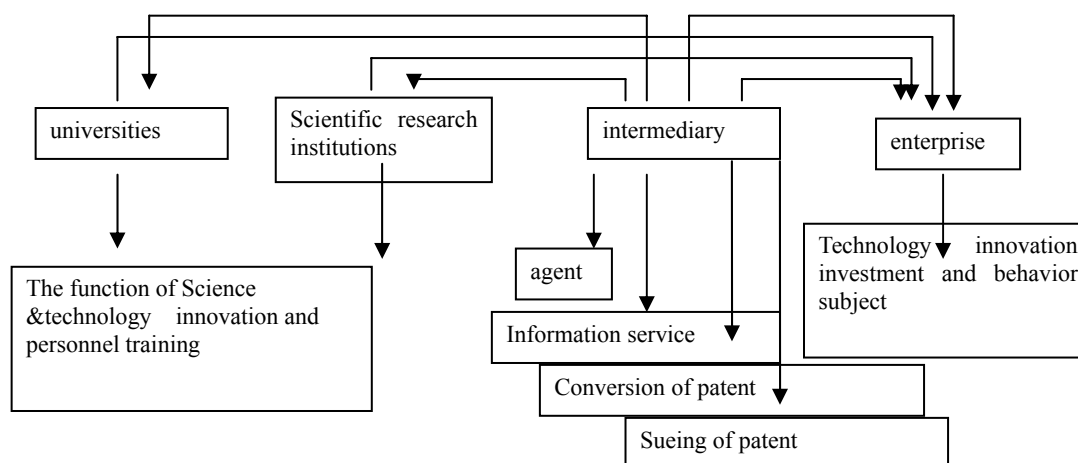
College patent industrialization could not exist and develop in the society in isolation, colleges are the most active system in the national innovation system, especially in recent years, the subsystem high-tech research universities is an important force is emerging. College patent industrialization is not only the needs of the development of the universities in China, but also the actual need, it is necessary to position the status of universities in the national innovation system.

Technology innovation subject include scientific research institutions, universities, enterprises and intermediary, the main functions of each are shown in figure 2. Positioning the status of university in the national innovation system, science and technology innovation system of colleges and universities should concern with the contact between innovation system. Although the university can not being as

<sup>1</sup> Song jian. Superior Intellectual Property Protection and the Common Development of Regional conomy. Jiangsu Law, October 17, 2006

<sup>2</sup> Li Chenxi, Ao Xiang. College Patent 2009 Information Service Platform System. The State Intellectual Property Office Network, April 24,

pure market legal to make business, it can keep in scientific research, keep closely with market such as know the market information initiatively, research and arrange patent application and obtain independently. Orientate the status of the college by the patent industrialization, so that college and university innovation research and talent cultivation can be combined in market environment, and it should not be obtained from college clique interest circulation, and as a means of honor and profit by producing the patent for the units or individuals. Through college patent, achieving the activating industrialization of technology transfer, technology transfer, production and capital market, property right financing, it will fundamentally improve the scientific development in the technology innovation system and cooperate the efficient operation of the national innovation system.



**Figure 2 National Science and Technology Innovation Subject**

**4.2 Improve the quality of college patent**

Patent quality refers to the patent technology content (creativity, utilization), which determines whether the patent can rapidly industrialized, it is the primary conditions of patent industrialization. The value of patent is application, only which combined with the market can be turned into economic benefit, can be of quality, if the patent can't be industrialized is the waste of knowledge, patent application and maintenance costs, patent will lose its value.

Practice has proved, patent that meet with market needs can attract investment, can be quickly transferred to the market and be transformed into real productivity. Given college patent the market, taking market demand as the direction of the research, taking market recognition as a patent application standard. College patent technology researchers must strengthen the consciousness of the effective patent implementation for product, pay attention to the production practice and research on technical problems, reflect on market demand for technology product, make market survey, the content includes: technical background, market demands, like products, products distribution, the market expectations, etc. Then carry out patent inventions based on the patent index, improve the possibility of the commercialization of technology, normative of the development and the reliability of the product performance, increase the number of college initiative patent, improve preciseness and maturity of patent technology. In the implementation of the patent, guide measures, such as a proportion of patent transfer fee is stipulated to inventor, guide the personal aim at implement and transfer of the patent, apply for high technology invention patent, improve their quality and increase the conversion rate of patent.

**4.3 Strengthen the patent law**

The patent law is the intellectual property system promoting technical innovation and knowledge innovation under the condition of socialist market economy. It has the positive significance in strengthening the legal system, straightening out the patent management and encouraging college patent technology development, enhancing the patent college patent industrialization and competitiveness.

To strengthen the patent law requires: to strengthen comprehensive legislation, make clear the scientific and technological achievements, avoid the loss of property ownership college patent, Establishing and perfecting intellectual property protection, scientific and technological achievements and patent ownership policies and standard patent system in the science and technology management, adjust the interests relation, motivation and safeguard the function and effect of technology innovation,

Increasing the patent law propaganda, help college patent and the patent technology innovation subject understanding, grasp the newest technology innovation level, development trends and save time, reduce cost and risk Formulate college patent examination and management rules and regulations, perfecting patent protection system, pay more attention to patent overall strategy.

## 5 Conclusion

The universities have rich technical resources, they are not only the base for intelligence and knowledge spread and innovative personnel training, but also the base of knowledge innovation and technological innovation. In recent years, with more attention are paid to the university of intellectual property rights, the patent license number increase, however, the patent technology self-defects, patent industrialization market mechanism, patent loss, our universities patent industrialization rate is low, all these inhibit innovation ability and further improvement. Therefore, colleges and universities in China should be accurately positioned in the patent implementation and the patent industrialization status. We should improve their quality, establish college patent industrialization base, improve patent industrialization service agencies, and promote the combination of college patent around the patent law, strengthen the alliance, and make the college the real point as high-tech industrialization and radiation.

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