

# Research on Problems and Countermeasures of Intellectual Property Management in Anhui Colleges and Universities

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## Abstract

Intellectual property right is crucial to the scientific and technological progress and economic development of a country or region. As research and teaching institutions, universities are a major force in the creation of intellectual property. Anhui province is a major intellectual property province in China. It has a number of science and engineering universities such as University of Science and Technology of China, and HeFei University of Technology. There are many patent applications and authorizations in colleges and universities in Anhui province each year, but there are still many shortcomings in the management of intellectual property, which are mainly manifested in the lack of intellectual property strategic management awareness, imperfect management system, unsound management institutions and the serious loss of intellectual property right and the low conversion implementation rate. To address these missing points, it is necessary to draw lessons from the experience of universities that have done relatively successfully in the management of intellectual property at home and abroad, and actively explore the establishment of intellectual property management models suitable for their own situation. Through establishing a sound intellectual property management system and system, speeding up the training and introduction of intellectual property management professionals, paying attention to the transformation and implementation of scientific research results, and rationally distributing the benefits of scientific and technological achievements and other measures to improve the status quo, and give better play to the benefits of intellectual property in universities.

**Keywords:** Anhui Colleges and Universities, Intellectual Property Management, Problems, Countermeasures

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## Foreword

On May 30, 2016, General Secretary Xi Jinping proposed at the National Science and Technology Innovation Conference that China should implement an innovation-driven development strategy and build China into an innovative country and a world science and technology power. Colleges and universities are an important supporting force for national science and technology innovation, and the construction of innovative universities is indispensable to the construction of an innovative country. Intellectual property is a prominent manifestation of the scientific research strength of colleges and universities. Therefore, the management of intellectual property in colleges and universities is crucial. In recent years, Anhui Province has vigorously developed the science and technology industry. Hefei, the capital of Anhui Province, its city card is "innovative highland". Hefei has achieved good results relying on the scientific and technological research and development and intellectual property creation of universities such as University of Science and Technology of China, Hefei University of Technology and so on. However, there are still many problems in intellectual property management in local colleges and universities, which hinder the development of intellectual property rights in colleges and universities and the construction of innovative provinces in Anhui Province. How to further strengthen the intellectual property management in colleges and universities has become an urgent matter.

## 1. General Situation of Intellectual Property in Anhui Universities

### 1.1 Numerous patent applications and authorizations

The "Thirteenth Five-Year Plan" period is a strategic opportunity period for China to move from intellectual property power to move toward intellectual property power. It is also an important strategic opportunity period for Anhui Province to leap from high-tech province and intellectual property province to strong science and technology province and intellectual property province. In recent years, the total number of patent applications in Anhui Province has continued to grow, and its development has grown by leaps and bounds. In 2016, the province applied for a total of 172,552 patents, a year-on-year increase of 35.1%. Among them, 95,963 invention patent applications were filed, a year-on-year increase of 40.5%, which was higher than the national average increase of 16.1 percentage points. In 2016, the province granted a total of 60,983 patents, an increase of 3.3%. Among them, 15,292 invention patents were granted, a year-on-year increase of 36.8%, higher than the national average increase of 22.1 percentage points, and the growth rate ranked first in the country. In 2017, the number of invention patent applications in Anhui Province reached 93,527, and a total of 12,440 invention patents were granted. As a new force in the creation of intellectual property rights, colleges and universities have the advantages of scientific research environment and innovative talents, and the number of patent applications is quite abundant. In 2016, the

province's colleges and universities applied for 5,094 invention patents, an increase of 45.6% over the previous year, accounting for 5.3% of the province's invention patent applications. The province's colleges and universities were granted 1,564 invention patents, an increase of 22.8% over the previous year, accounting for 10.2% of the province's invention patents. In 2017, the province's colleges and universities applied for a total of 13,234 patents and 6,474 patents were granted. Generally speaking, in terms of the number of patent applications, Anhui Province has reached the level of a large intellectual property province, but it is not a strong intellectual property province. Building a strong intellectual property province, universities, especially science and engineering colleges and universities play an important role.

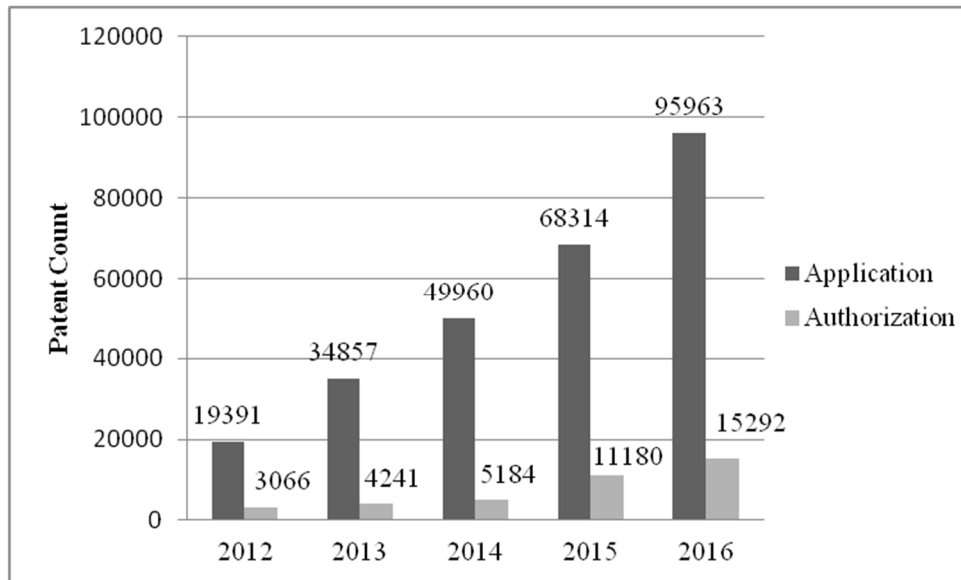


Figure 1. The number of invention patent application and authorization in Anhui Province from 2012 to 2016  
 (Data from Anhui Intellectual Property Office)

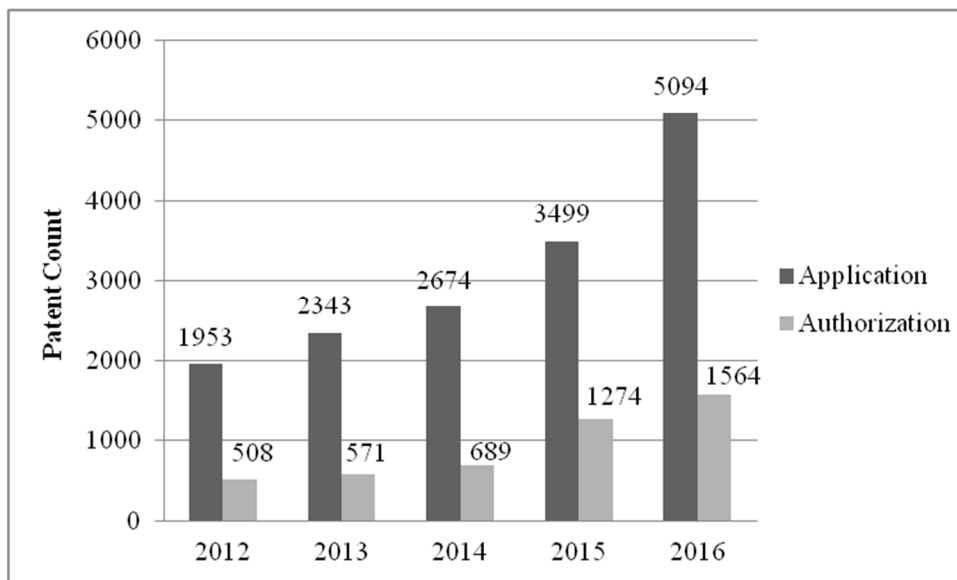


Figure 2. The number of application and authorization for invention patents in colleges and universities of Anhui Province from 2012 to 2016  
 (Data from Anhui Intellectual Property Office)

### 1.2 Patent application quality is not high

Although the number of patent applications in Anhui Province has grown rapidly, the quality of patent applications is not high. According to the statistical analysis of patents in Anhui Province in 2016, 95 963 patents were applied

for and 15 292 patents were authorized, accounting for only 15.9% of the total patents. In 2016, 5094 invention patents were applied for by provincial colleges and universities, 1564 were authorized, and the number of authorized invention patents did not exceed 31%. As shown in Figure 3, although the licensing rate of invention patents in universities in Anhui Province and the province has generally increased in recent years, compared with the invention patent authorization rate and implementation conversion rate of developed countries and internationally renowned universities in Europe and America, there is still a big gap. In addition, the average duration of effective invention patents in Anhui Province in 2016 was 4.7 years, and the average duration of effective invention patents in universities was 4.53 years. Many invention patents have expired due to unpaid annual fees. According to the patent statistics analysis report, in 2016, among the top ten applicants for invalid inventions in Anhui Province due to patent unpaid annual fees, colleges and universities occupy seven seats, University of Science and Technology of China and Hefei University of Technology failed 253 and 188 respectively, and the Hefei Institute of Physical Science of the Chinese Academy of Sciences failed 93. The invention patents infringed by Anhui Science and Technology College lasted only 4.39 years. The total number of invention patent applications is relatively large, the proportion of authorized invention patents is low, the average maintenance period of effective invention patents is short, and the situation of patents “big but not strong, and not excellent” still exists. The quality of patents, especially for university patents, needs to be improved, and the technical content needs to be improved.

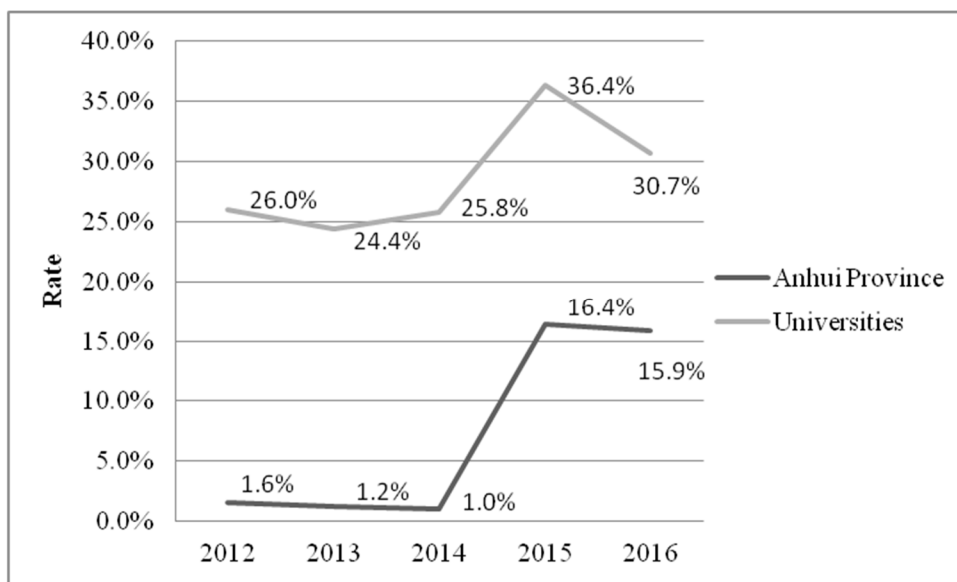


Figure 3 Authorization rate of invention patents in Anhui Province and universities in 2012-2016  
 (Data from Anhui Intellectual Property Office)

## 2. Problems of Intellectual Property Management in Anhui Colleges and Universities

### 2.1 Insufficient awareness of intellectual property strategy management

In the era of knowledge economy, colleges and universities are an important source of scientific and technological innovation and a new force of intellectual property creation. Intellectual property management in colleges and universities is indispensable. Strategic management emphasizes the importance of strategically looking at intellectual property from a global perspective, and formulating overall and long-term strategic planning around the creation and implementation of intellectual property, including strategic objectives, strategic measures and so on<sup>[1]</sup>. Besides teaching and scientific research, serving the society is also an indispensable function of colleges and universities. In today's era when technological innovation and intellectual property are increasingly important, the state encourages colleges and universities to actively participate in the creation, transformation and implementation of scientific and technological achievements, and to serve the country and social and economic development. Only by having this kind of overall awareness and standing at this strategic level can colleges and universities take on the mission entrusted by the state and history. However, at present, many university leaders and researchers are still relatively weak in the awareness of intellectual property strategic management, and lack enough attention to intellectual property management at the strategic level, resulting in low quality of patents, loss of intellectual property rights, low implementation rate of intellectual property transformation and other problems. Judging from the situation of various universities in Anhui Province, although the state has formulated intellectual property-related strategies, the Anhui Provincial Party Committee and the provincial government have also issued policy documents related to the national intellectual property strategy, and many universities have not formulated their

own intellectual property strategic plans, lack of long-term plans for their own intellectual property development. For a long time, influenced by traditional cultural concepts, colleges and universities are mostly concerned with the tangible assets of schools, focusing on the protection of tangible assets, but lack of understanding of the advantages and values of intangible assets such as intellectual property rights, ignoring the existence of intangible assets<sup>[iii]</sup>. In terms of teachers and students in colleges and universities, many university teachers are eager to publish papers and conduct technical appraisal for the evaluation of professional title and promotion of their positions. This has caused a large number of scientific and technological achievements to lose the novelty of patents or patent technologies, and cannot be protected by patent law. There is a lack of intellectual property education for teachers and students in colleges and universities, and insufficient publicity on intellectual property rights laws and regulations, leading to a weak awareness of intellectual property protection among teachers and students.

### *2.2 Imperfect intellectual property management system*

A sound management system is the prerequisite for ensuring the smooth development of intellectual property management in colleges and universities. At present, although the state has issued a number of policy documents related to the management of intellectual property rights in colleges and universities, such as the 2004 “Several Opinions on Further Strengthening the Intellectual Property Work of Colleges and Universities” and 2006 “the Outline of the National Medium and Long-Term Science and Technology Development Plan (2006-2020)”, 2008 “ National Intellectual Property Strategy Outline (2008-2020) ”, etc. However, from the survey results, the management system of intellectual property rights in colleges and universities, especially the management system of secondary departments, is still not perfect. Specifically, some universities have not formulated intellectual property management methods; some universities have formulated the implementation methods of intellectual property management but have not been implemented, and become a piece of paper; some colleges and universities intellectual property management work focuses on scientific research management, limited to patent applications and results management, while ignoring the implementation of patents and the transfer of results; more colleges and universities do not have a special intellectual property management organization, and the management of intellectual property is mostly supervised by scientific research departments and lacks specialized management talents. The lack of management system has led to the poor management of intellectual property rights in colleges and universities in Anhui Province, which has affected the effectiveness of intellectual property rights in colleges and universities.

### *2.3 Intellectual property management institutions are not perfect, and managers are poorly professional*

The management of intellectual property in colleges and universities is a highly professional job, and it is difficult to carry out without special management institutions and professionals<sup>[iiii]</sup>. According to the survey, as of now, most colleges and universities in Anhui Province have not set up independent intellectual property management institutions, and intellectual property management is generally managed by the scientific research department of the school. Most universities set up an intellectual property department under the science and technology department or the scientific research office, but their work focuses on patent application and management of scientific and technological achievement. Some colleges and universities do not even have specialized intellectual property management personnel, but are also served by the administrative staff of the scientific research department. This has caused the powers and responsibilities of intellectual property management in colleges and universities to be unclear and the level is low, making it difficult to carry out substantive and whole-process intellectual property management. The survey also found that many colleges and universities not only have the phenomenon of lack of specialized management institutions and personnel at the school level, but also more secondary departments lack special personnel for intellectual property management. The current situation is that most of the intellectual property management personnel of the secondary faculty are transferred from administrative positions or multiple positions. They rarely receive formal IP system training, have no comprehensive system of intellectual property knowledge, which makes it difficult for them to be competent in the management of intellectual property.

### *2.4 Significant loss of intellectual property rights and low conversion rate*

At present, due to the lack of effective management system, the backwardness of management concepts and the irregular behavior of teachers and researchers, colleges and universities have become the hardest hit areas of intellectual property loss, which is not conducive to the maintenance of the legitimate rights and interests of colleges and universities<sup>[iv]</sup>. There are many manifestations of the loss of intellectual property rights in colleges and universities, some of which are weak in the awareness of intellectual property protection, and intellectual property rights are sold and transferred at a low price when they cooperate with or engage in business with off-campus enterprises. Some college teachers and researchers apply for non-service inventions by utilizing the scientific research equipment and technical data of the university, resulting in the loss of intellectual property rights in

colleges and universities. There is also the loss of scientific and technological achievements with the transfer of teachers and researchers, the off-campus part-time work of non-standardized personnel, the participation of Ph.D. and M.A. in scientific research projects, and the removal of technical secrets<sup>[v]</sup>. In addition, the implementation conversion rate of scientific and technological achievements and patents in universities is relatively low. Because the evaluation and upgrade of university teachers' titles are linked to the number of papers and patent applications, many teachers and researchers in universities apply for patents in order to apply for patents, not paying much attention to the quality of patents and whether patents meet the needs of the market. Due to the imperfection of intellectual property management institutions and the lack of specialized intellectual property management personnel, colleges and universities only pay attention to the examination of patent applications and technical achievements, resulting in a large number of inferior patents and "sleeping" patents<sup>[vi]</sup>, the implementation of patents is not optimistic.

### **3. Specific Countermeasures for Optimizing the Intellectual Property Management of Anhui Colleges and Universities**

#### *3.1 Perfecting intellectual property management system*

Perfect intellectual property management system is the fundamental guarantee for strengthening intellectual property management in colleges and universities. At the strategic level, university leaders should enhance their strategic awareness and strategic vision, formulate the overall development plan for intellectual property management in universities, and at the tactical level should be guided by the needs of national intellectual property strategies and combined with the actual situation of intellectual property rights of the university to formulate detailed, systematic, enforceable intellectual property rules and regulations, improve implementation rules related to intellectual property management, and in particular focus on the transfer of intellectual property. Key universities in Anhui Province, such as the University of Science and Technology of China and Hefei University of Technology, can learn from the OTL intellectual property management model of Stanford University, and establish a special intellectual property management institution by the university. The scientific research personnel submit scientific and technological achievements to OTL, and OTL is responsible for screening and evaluating scientific and technological achievements, and develop appropriate licensing programs, including the choice of intellectual property forms and patent application programs, research results marketing programs, licensing negotiations and the distribution of property rights<sup>[vii]</sup>. In addition, OTL should keep close contact with enterprises, find those companies that are interested in technological achievements with commercial potential, and reach a licensing agreement after authorization negotiation, so as to bring high-quality technological achievements to the market. In the construction of intellectual property management organization system, colleges and universities should establish special intellectual property management institutions, equipped with professional intellectual property management team, and form a docking between the two levels of organization system. Intellectual property management functions in colleges and universities should be combined with technology transfer functions and investment functions to improve the efficiency of intellectual property transfer and transformation.

#### *3.2 Accelerating the training and introduction of intellectual property management professionals*

Promoting the professional level of intellectual property management in colleges and universities is the core of intellectual property management in colleges and universities, and high-quality and professional intellectual property management talents are the key to intellectual property management in colleges and universities<sup>[viii]</sup>. At present, there is a lack of high-quality intellectual property management professionals in China's universities. For this kind of scarce talents, colleges and universities must pay enough attention. On the one hand, they should strengthen the training of intellectual property professionals, pay attention to the recruitment of students with science and engineering background, and focus on cultivating masters of intellectual property application. On the other hand, universities should actively introduce intellectual property management professionals at home and abroad, especially those with practical experience in intellectual property application maintenance, intellectual property licensing, intellectual property investment, and intellectual property contract management, etc. The relevant competent departments of the state and provincial and municipal government should formulate and raise special plans and funds for implementing the strategic measures of "strengthening the construction of intellectual property talents" in the National Intellectual Property Strategy Outline as soon as possible, and actively promote and enhance the work of on-the-job and in-school intellectual property education and personnel training in colleges and universities. Expanding the knowledge of intellectual property creation, protection and management by holding special lectures and elective courses on campus and in class<sup>[ix]</sup>. The intellectual property management talent team in colleges and universities must have a certain number of compound intellectual property management professionals with the background of science and engineering education.

#### *3.3 Focus on the transformation and implementation of scientific research achievements*

There are many high-quality scientific and technological achievements in colleges and universities, but the

implementation rate of scientific and technological achievements is low. This is related to the high-achieving and light-transformed intellectual property awareness concept that is common in colleges and universities. The implementation of the transformation of scientific and technological achievements is an important part of the management of intellectual property in colleges and universities. In order to optimize the management of intellectual property rights, colleges and universities must improve the implementation rate of scientific research achievements, and university leaders and intellectual property management personnel must have the awareness of transformation and implementation. First, colleges and universities should pay attention to the implementation and transformation of scientific and technological achievements. Intellectual property management institutions and personnel should comprehensively consider patent applications for scientific and technological achievements, screening and evaluation of scientific and technological achievements, intellectual property licensing and investment, etc., and focus on the selection of scientific and technological achievements with market potential for market-oriented operation; Secondly, colleges and universities should further strengthen the awareness of implementation of achievements transformation among teachers and researchers, make them fully aware of the importance of implementation of achievements transformation, and consider the market prospects when setting up or choosing scientific and technological projects; Thirdly, strengthen the construction of platforms for transformation of scientific and technological achievements, conditional colleges and universities can learn from foreign intellectual property management models and establish technology transfer offices, intellectual property management or technology transfer companies, and promote the transformation of scientific research results through their own transformation platforms. Other colleges and universities can strengthen the links with technology transfer intermediaries and enterprises, actively explore new ways of transformation of scientific research achievements, seek commercial cooperation in technology transfer to the market, so as to promote the transformation and implementation of patent achievements in universities.

#### *3.4 Rationally distributing the benefits of transforming scientific and technological achievements*

After colleges and universities successfully complete the transformation of scientific and technological achievements, the issue of income distribution needs to be treated with caution. To formulate clear and fair distribution principles, and appropriately increase the proportion of distribution of major R&D personnel. Generally, the proportion of income distribution of major R&D personnel is not less than 50%. Among the key universities in China, Tsinghua University stipulates that 70% of the returns of achievements should be awarded to the accomplishors; Wuhan University stipulates that 70% of the returns of horizontal scientific research projects should be attributed to the scientific research team; and 60% of the returns of vertical scientific research projects should be attributed to the scientific research team. The distribution of income from scientific and technological achievements should emphasize the principle of technical elements, and the proportion of distribution can be divided according to the contribution of the participants in the same scientific research project. In addition, according to their own condition, colleges and universities can not only give one-time incentive, but also award by stages, or in the form of technology equity, establish the incentive policy of the share of technology shares that inventors should have after the transformation of achievements, and implement the share-holding incentive system. Correctly handling the relationship between the benefits and rewards of scientific and technological achievements will directly affect the creative enthusiasm of researchers.

#### **4. Conclusion**

In the entire system and process of intellectual property creation, protection, application, management and service, intellectual property management plays an integral role and is an indispensable link. The management of intellectual property in colleges and universities involves many factors such as rules and regulations, institutions, personnel, funds and so on. It is a systematic project. In order to strengthen intellectual property management in colleges and universities of our country, especially in Anhui Province, we should start with various factors, establish and improve the intellectual property management system, set up special intellectual property management institutions, equip professional intellectual property management personnel, pay attention to the implementation and transformation of scientific research results and rationally distribute the transformation benefits of scientific and technological achievements, stimulate the creativity of scientific researchers, and optimize the environment of intellectual property management, and give full play to the role of intellectual property management in promoting the construction of universities and social and economic development.

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