



Intellectual Property and Technical Management of Universities and R&D Institutions: Chinese Experience

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Preface

Universities are not only the high ground of knowledge gathering, but also an important platform for the emergence of scientific and technological achievements. In recent years, with the in-depth implementation of the national intellectual property strategy, the awareness of intellectual property rights in universities has been significantly enhanced, and the **number of patent applications and licenses** has increased rapidly.

2014	Over 1,800 invention patent applications	4 institutes
2015		7 institutes
2014	Over 1,000 invention patents licensed	2 institutes
2015		5 institutes

Patent conversion has become an important way for universities to realize technology transfer and industrialization. Represented by **Fudan university and Shanghai Jiaotong University**, certain achievements have been made in the industrialization of patents. However, patent conversion rate is still low in colleges of our country. The **effective invention patent implementation rate** was only **16.2%** in 2015. How to take effective measures to improve the patent conversion rate of colleges and universities in China, to realize the industrialization of innovation results in universities have become a matter of high concern for government departments, university administrators and researchers.

Science and Technology Administration

1. Science and technology administration is the basic institute of intellectual property and technology management in universities

- a. Carrying out the national science and technology policies and formulating plans for school science and technology work**
- b. Laboratory management**
- c. Management of scientific research projects**
- d. Technical work and achievements management, awards declaration**
- e. Combining industry, academy and research to promote the industrialization of scientific and technological achievements**
- f. Patent declaration and daily management**
- g. Science and technology promotion and communication**

2. Independent Information Release Agency

—Peking University Information Publishing Platform



The **Office of Science and Technology Development** of Peking University was established. Focusing on technology transfer, and by issuing "**enterprise technical needs**", it points out the direction for scientific research units and individuals to create intellectual property rights.

Meanwhile, it publishes the "**key technology promotion**" of intellectual property acquired by the colleges, to attract the enterprises that have the need for or interest in cooperation, etc.



3. Multi-agency Collaboration — Tsinghua University

① Tsinghua University has established the **Office of Science and Technology Development**, which specializes in the management of intellectual property rights in the development and management of science and technology.

② Tsinghua university has established the **Tsinghua university Technology Transfer System**, which is backed by Tsinghua University and Enterprise Cooperation Committee, Overseas Project Department, International Transfer Center, and Science and Technology Development Department, boasting significant strength. With introduction of foreign advanced technologies, and relying on the strong scientific research strength of Tsinghua University, it helps the domestic enterprises absorb foreign technologies and serve the enterprise's development and innovation.

③ Tsinghua University has established the office of university-industry cooperation, cooperation fund, UURR (university, university, enterprise, enterprise cooperation) and the associated research and development organizations.

The model of Tsinghai University is close to the **OTL (technology licensing office)** model of universities such as Stanford University in the protection of intellectual property rights and technology transfer



4. The intellectual property management office model is adopted for the Science and Technology Administration



Such as at **Central South University**, the Office of Intellectual Property Management is set up to take charge of the intellectual property work of the whole university.



Such as at **Chongqing University**, the Office of Intellectual Property Management is set up in the Science and Technology Administration, responsible for the management of intellectual property rights in the university.

5. Universities establishes a technology industrialization intermediary platform



Shanghai Jiaotong University sets up the intermediary platform “METALAB”.

In 2015, technology industrialization was realized with 300 enterprises.

6. Universities set up a comprehensive research platform for intellectual property rights



(1) Chongqing Collaborative Innovation Intellectual Property Research Center of Chongqing University



(2) Guangxi Institute of Intellectual Property Development

Brief Summary



-
- (1) The intellectual property and science and technology management departments of Chinese universities are based on the science and technology department, but at the same time, exist in various forms.**
 - (2) Each of the universities is exploring ways to build institutes that work for them.**
 - (3) Better models are still being explored.**

II. Number of patent applications by universities keeps improving

- (1) Colleges and universities are the main force of Chinese patent application
- (2) The number of college patent applications is huge - more than 10 percents of the country's total. In 2016, 1,339,000 invention patents were applied, a year-on-year growth of 21.5 percents, the highest in the world for six consecutive years.
- (3) Covering a wide range of areas, covering all known areas of science and technology
- (4) High point of innovation: breakthrough technology

In 2015 , more than 1,800 patents was filed in seven universities including Zhejiang University, Harbin Institute of Technology and Southeast University.



III. Number of patent licenses of universities keeps increasing

- (1) **Background:** In 2016, the number of domestic invention patents exceeded 1 million for the first time.
- (2) **In 2016,** a total of 404,000 patents were granted, of which 302,000 were authorized for domestic invention, an increase of 14.5 percents year on year.
- (3) **Estimate (15%):** 60,000 patents were licensed in universities in 2016.



IV. Patent conversion and conversion rate of universities

Technology industrialization ranking of Chinese universities in 2016

- 1 Tsinghua University 593522 (594 million)
- 2 Hefei University of Technology 247540
- 3 Southeast University 169832 (170 million)
- 4 Shanghai Jiaotong University 104871 (105 million)
- 5 Fuzhou University 83280 (80 million)

6 Zhejiang University 64392 (60 million)

7 Nankai University 62683 (60 million)

8 Northeast Electric Power University
58566 (58 million)

9 Nanjing University of Technology 50122
(50 million)

10 Xi'an Technological University 46471
(46 million)

**60 Chongqing University 6200
(6.2 million)**



Achievements made the conversion of college patents in China

Since 2015, represented by **Shanghai**, significant achievements were made the conversion of college patents in China



1. Benefit of **IP conversion** was remarkable



2. The **IP conversion mechanism and talent team** of colleges and universities were initially formed

- (1) In 2014, patent conversion rate in universities in China was 13.5%
- (2) Since 2015, represented by Shanghai, significant achievements were made the conversion of college patents in China
- (3) On March 15, 2016, Fudan University entered into licensing agreement with (US) HUYA Bioscience International (Shanghai), to license the patent of IDO inhibitor for tumor immunotherapy treatment to the latter, with the license fee being USD65 million.
- (4) In 2015, Shanghai Jiaotong University realized patent conversion revenue of RMB53.86 million, doubling that in 2014.



Achievements made the conversion of college patents in China

3 reasons for the achievements

1. The **laws and regulations** are gradually improved, and the drive for conversion is released continuously



The provisions on the **right of disposal and profit** of scientific and technological achievements **delegated** by universities and scientific research institutes established by the state have been specified

The rules further clarify the rights of disposal, profit of scientific and technological achievements delegated, and encourage scientific and technological personnel for innovation and entrepreneurship. It has broken the **institutional and mechanism barriers** for colleges and universities, research institutes in IP conversion and application

Further clarify and refine the transformation of scientific and technological achievements and deploy specific tasks.



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Achievements made the conversion of college patents in China

2. Quality of scientific and technological achievements improved and layout of intellectual property optimized

The state has gradually strengthened its investment in scientific research, which has driven a large number of high-quality scientific and technological achievements in universities and research institutes and promoted the formation of IP layout based on scientific and technological achievements

3. Management level lifted and conversion ability strengthened

The management of universities and research institutes has been developed in a systematic, refined and systematic way, so as to gradually make breakthroughs in the transformation of intellectual property rights.



4. Intellectual property consultant system

Chongqing University and Guangxi University of Nationalities have established an intellectual property consultant system for the principal, for examination of important intellectual property rights affairs in them.

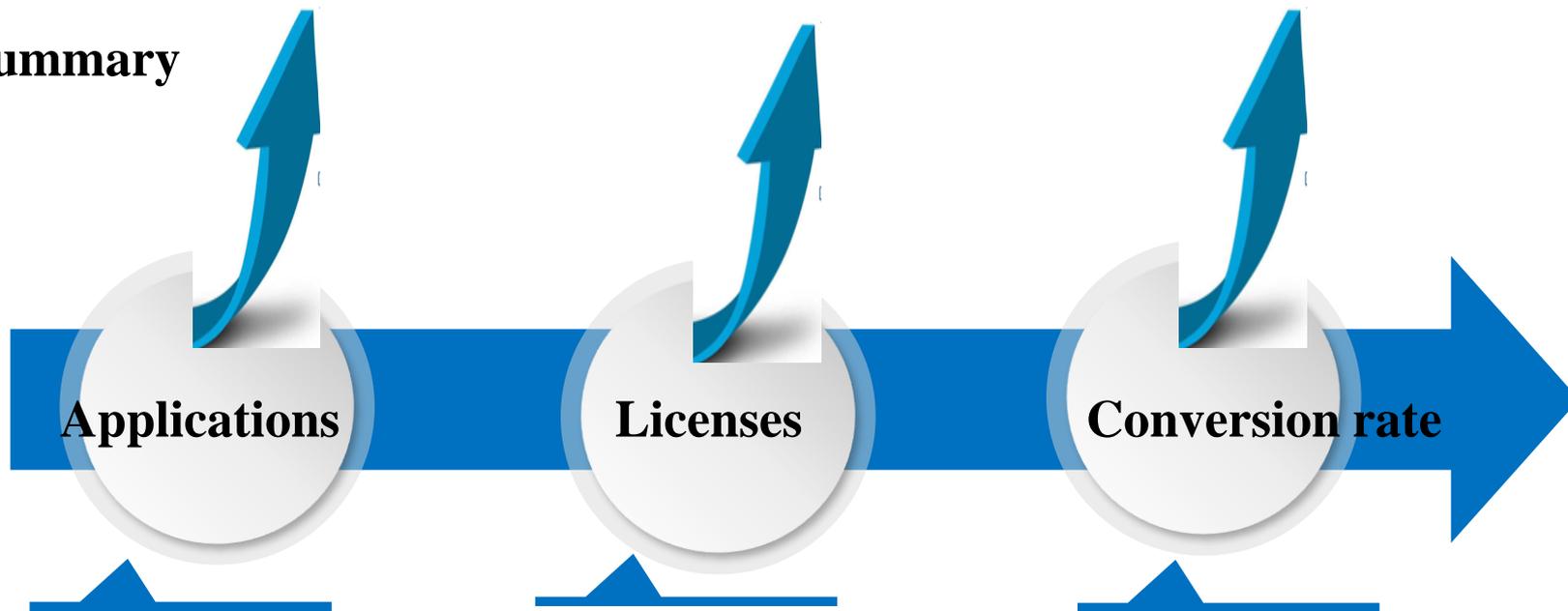


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Summary





Part II Problems existing in intellectual property management of universities and research institutes



I Lack of patent thinking, paper first and patent later

1. In the aspect of intellectual property **strategy awareness**, most colleges and universities do not include intellectual property in the overall development strategy, and lack the awareness of intellectual property strategy.
2. The “patent review system for scientific papers” is in urgent need



II. Problems existing in intellectual property management of universities and research institutes



I Lack of patent thinking

3. Before the project is established, without survey, it is too eager to study

4. Neglecting patent application, fond in technical appraisals, and accepting interviews and TV shows have resulted in the loss of novelty of scientific research results.



II. Problems existing in intellectual property management of universities and research institutes



Management level

1. Backward IP **organizational system**
2. Imperfect IP **income distribution system**
3. Lack of IP **professional talents**

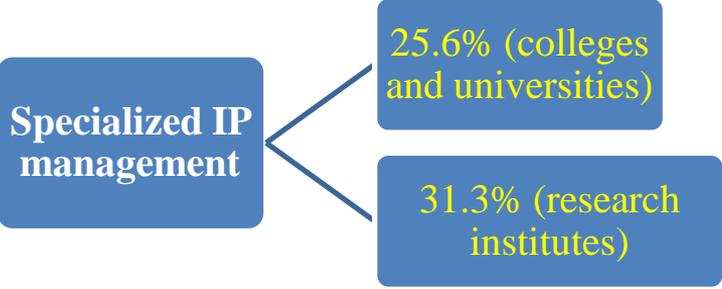


II. Problems existing in intellectual property management of universities and research institutes



II

IP management level



Specialized IP management

25.6% (colleges and universities)

31.3% (research institutes)

1. Backward IP organizational system

The intellectual property management of most scientific research institutes and universities in China is usually by the science and technology department or the scientific research office, with the specialized intellectual property management department in need.

According to State Intellectual Property Office , the colleges and universities and research institutes having specialized intellectual property management sectors accounts for only 25.6% and 31.3% respectively; more than 2/3 of the scientific research institutes and universities have not established intellectual property management rules and regulations.



II. Problems existing in intellectual property management of universities and research institutes



II

IP management level

2. Imperfect IP income distribution system

The system of ownership of intellectual property rights and the benefit distribution system of Chinese scientific research institutes and universities fail to perform their due incentive function.

China's patent law and the law of promotion of scientific and technological achievements have provided the **minimum incentive** for the transformation of the scientific and technological achievements to the inventors, but many institutes adopt the minimum incentive as the **basic standard**.

3. Lack of IP professional talents

IP institutes are not well established and lack of professional talents, resulting in the failure to carry out effective and whole process of IP management protection.





II. Problems existing in intellectual property management of universities and research institutes

III

IP loss is a commonplace

IP personnel and the achievement management mechanism are not coordinated with each other, leading to the **IP loss**. On the one hand, the development of science and technology industry in colleges and universities is not standardized, leading to the IP loss. On the other hand, the problem of scientific and technical personnel also results in such loss, such as core technology loss due to personnel outflow achievements copied or obtained by other entities in the technical cooperation and technical exchange with other people and social part-time activities, **achievement publication** causing patent loss due to published articles and achievements appraisal, etc.



II. Problems existing in intellectual property management of universities and research institutes



IP application level

1. Low patent **transfer rate**
2. Low patent **implementation rate**
3. Low patent **licensing and industrialization rates**



II. Problems existing in intellectual property management of universities and research institutes

IV

IP application level

2015 patent transfer rate (Unit: %)

	Unive rsities	Research institutes	Total
Valid invention patents	3.8	6.6	5.4
Valid utility model	1.6	2.9	5.1
Valid appearance design	1.3	6.3	6.0
Total	1.9	4.4	5.4

Source: State Intellectual Property Office *2016 China Patent Survey Data Report*

1. Low patent transfer rate

According to *2016 China Patent Survey Data Report* of State Intellectual Property Office, the patent transfer rate of universities of China in 2015 was only 1.9%.

At present, for the intellectual property management of universities and research institutions with patents as the main body, the total number of applications and licenses has increased rapidly. However, the transfer of patents with application as the core is still weak.

II. Problems existing in intellectual property management of universities and research institutes

IV

IP application level

2. Low patent **implementation rate**

According to the *China Patent Survey Data Report* of State Intellectual Property Office, the valid patent implementation rate in 2014 of China was 57.9%, and that of the universities was only **9.9%**; the figures in 2015 were 61.8% and **12.1%** respectively.

2014 **patent implementation rate**

	Universities	Research institutes	Total
Valid invention patents	13.5	28.2	50.9
Valid utility model	9.3	43.3	59.0
Valid appearance design	9.0	46.7	60.1
Total	9.9	41.6	57.9

Source: State Intellectual Property Office *2015 China Patent Survey Data Report*

2015 **patent implementation rate**

	Universities	Research institutes	Total
Valid invention patents	16.2	29.2	52.9
Valid utility model	11.7	38.4	62.9
Valid appearance design	10.1	60.9	65.8
Total	12.1	42.4	61.8

Source: State Intellectual Property Office *2016 China Patent Survey Data Report*



II. Problems existing in intellectual property management of universities and research institutes

IV

IP application level

Patent licensing rate of 2015 (Unit: %)

	Universities	Research institutes	Total
Valid invention patents	5.8	5.6	6.7
Valid utility model	3.0	4.6	7.9
Valid appearance design	2.1	6.7	9.5
Total	3.3	5.4	8.1

Source: State Intellectual Property Office 2016 China Patent Survey Data Report

Patent industrialization rate of 2015 (Unit: %)

	Universities	Research institutes	Total
Valid invention patents	5.1	14.4	36.7
Valid utility model	3.1	20.6	46.2
Valid appearance design	2.4	43.6	52.4
Total	3.3	25.3	46.0

Source: State Intellectual Property Office 2016 China Patent Survey Data Report

3. Low patent licensing and industrialization rates

According to 2016 China Patent Survey Data Report, the total patent industrialization rate was 46.0%, for which the universities only accounted 3.3%; the patent licensing rate was 8.1%, in which the universities only shared 3.3%.



II. Problems existing in intellectual property management of universities and research institutes

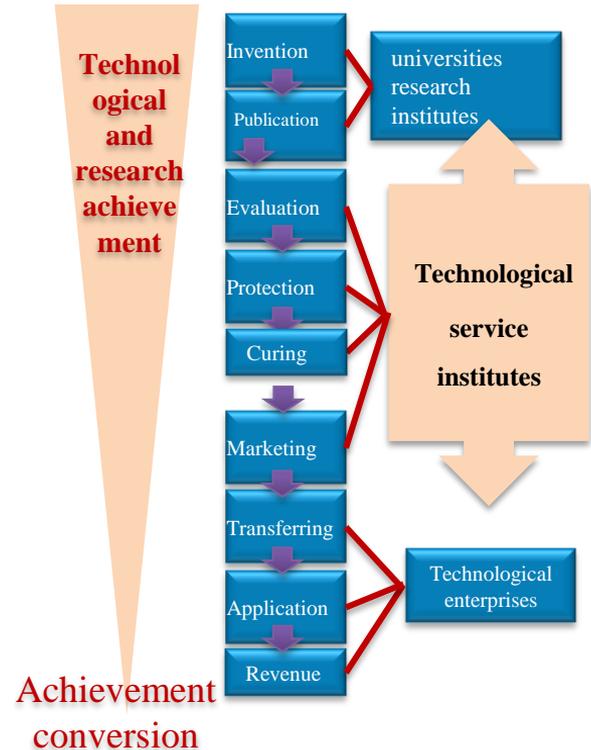
V

Technological achievement conversion is difficult

1. Why difficult?

Features of technological achievement conversion:

① **Systematicness** : Technological achievement conversion is a complex project which requires the integration of the whole chain, the combination of all elements and the participation of the whole society.





II. Problems existing in intellectual property management of universities and research institutes



V

Technological achievement conversion is difficult

② **Timeliness:** Conversion of scientific and technological achievements is like ice-cream sticks, not gold bricks. It needs to be very timely and the failure of being timely could lead to conversion worthless.

③ **Nonlinearity** : In the innovation ecosystem, the achievement conversion is no longer the result of "closed practice" in colleges and universities and then transfer to the enterprise.

④ **Uncertainty** : The value of scientific and technological achievements is uncertain. For the same technology, different buyers or different uses could lead to value identity not the same.



II. Problems existing in intellectual property management of universities and research institutes



V

Technological achievement conversion is difficult

2. Bottleneck problem

① Definition of concept “net income” is not clear

It is not clear whether the net income of conversion is included in the previous research and development.

② Due diligence liability exemption lacking operation guidance

In practice, when touching the “deep-water zone of reform” like achievement pricing, income distribution, decision-making liability exemption and resigning for entrepreneurship, due to the lack of clear operation guidance, in the face of different governing law articles, the main bodies (especially the main leaders) of conversion are with concerns, disoriented, leading to lack of drive for achievements conversion.



II. Problems existing in intellectual property management of universities and research institutes



V

Technological achievement conversion is difficult

2. Bottleneck problem

③ **Equity incentive** is hard to be implemented

The *Law of the PRC on Promoting the Transformation of Scientific and Technological Achievements* has not clearly defined the external investment pricing for the colleges and universities and other public institutions, yet the exciting policies are limit on them.

④ **Individual income tax** incentive is weak

For the individual income tax policy for technological achievement conversion incentive revenue, the wages paid in taxes is adopted, but the “linked incentive” is not realized in the same time, leading to the offset of incentive as expected to be brought about by that in the *Law of the PRC on Promoting the Transformation of Scientific and Technological Achievements*.

Part III Countermeasures and prospect of intellectual property management of universities and research institutes

1

Enhance awareness and improve the strategic position of intellectual property

Enhancing protection awareness



Premise of IP management

Executive level

Management level

Scientific research staff

Combining the three functions of scientific research and innovation, talent cultivation and social services of universities, to plan the management of intellectual property.

The coordination and cooperation among the management is the key to ensure the normal operation of intellectual property in colleges and universities.

The scientific research staffs are the direct personnel that create intellectual property right, and are the important factor that influences the intellectual property protection work of universities.

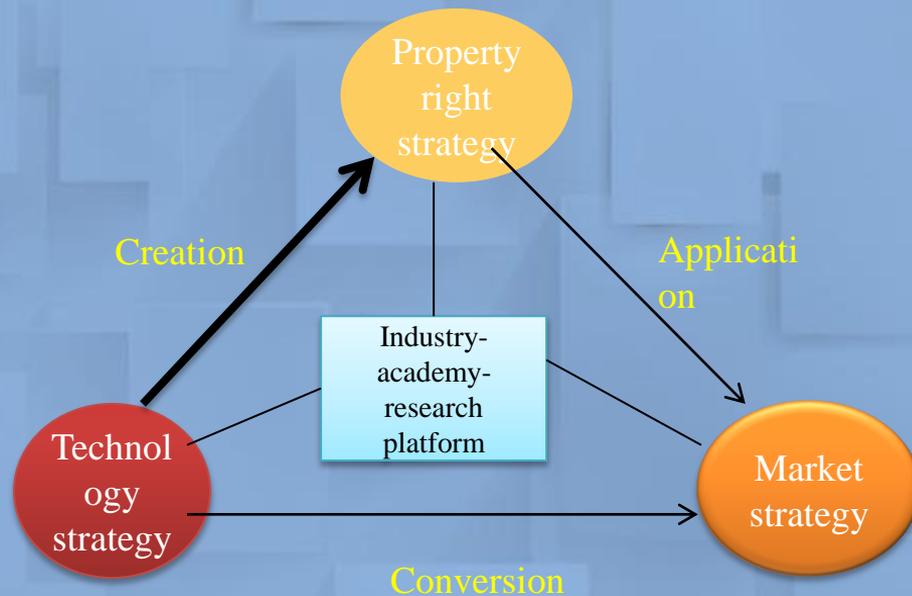


IV Countermeasures and prospect of intellectual property management of universities and research institutes

2

Innovating concept and improving IP management mode

To innovate the application concept and take the IP commercialization and industrialization as the target are the core of improving the IP management of universities.

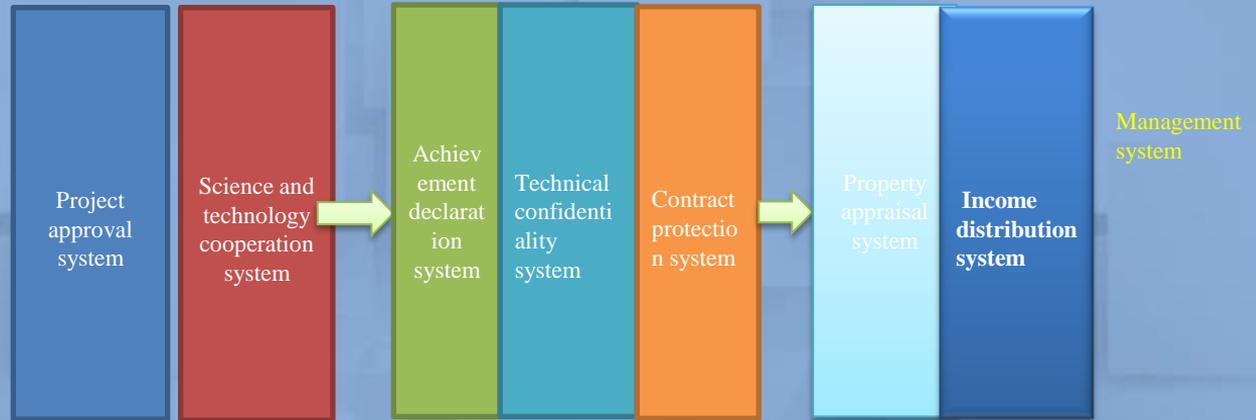


“Three-in-one” IP strategy under industry-academy-research platform

IV Countermeasures and prospect of intellectual property management of universities and research institutes

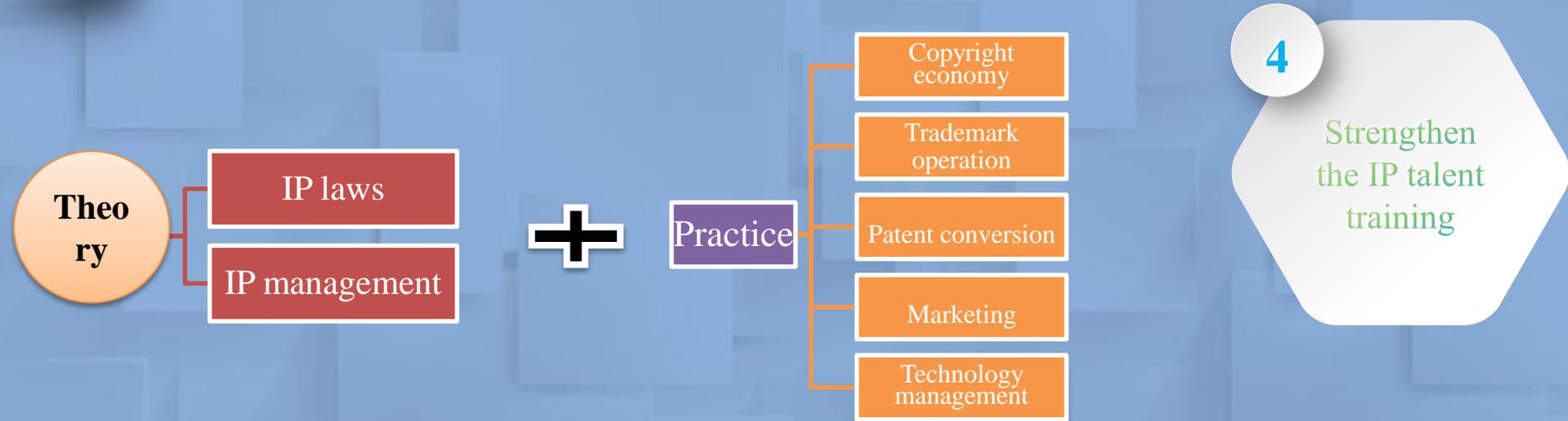
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Innovating system and improving IP management system



Establish the scientific research project examination and approval systems, be strict in the science and technology cooperation and supervision system, improve the achievement declaration system, improve the IP confidentiality and examination system, strengthen the contract protection system, implement the IP value appraisal system and improve the IP income distribution system

IV Countermeasures and prospect of intellectual property management of universities and research institutes



Inter-disciplinary talent cultivation mode

Strengthen the academic IP education, support scientific research institutes and colleges and universities to set up the **double-major program** of intellectual property management and run **interdisciplinary** doctoral degree education, and run the compulsory courses of intellectual property law and intellectual property management

5

Measures to solve technological achievement conversion problem

1. Current systems

Major institutional framework

Entitled to convert



Right, responsibility and interest of those who convert

Rights and obligations of those who have converted

Willing to convert



Income distribution system of achievement conversion

Due diligence system of achievement conversion

How to convert



Investment pricing method of technological achievements

IV Countermeasures and prospect of intellectual property management of universities and research institutes

5 Measures to solve technological achievement conversion problem



Independent disposal

Except for that involving state secrets and national security, conversion of technological achievements is not subject to approval or filing



Independent pricing

Prices of achievement transfer, licensing or investment price could be determined by agreement



Independent incentive

The institutes could specify or agree with the technological staffs on the ways, amount and time limit of incentives and rewards, and implement them independently, except for otherwise regulated by the country

2. Measures to solve the “entitled to convert” problem of universities

5

Measures to solve technological achievement conversion problem

3. Measures to solve the “willing to convert” problem of universities

① Income to be retained in the institute

All income from achievement conversion by universities and colleges is to be retained in those institutes.



5

Measures to solve technological achievement conversion problem

3. Measures to solve the “willing to convert” problem of universities

② Guaranteeing the benefits of those who realize and who convert the achievements

* Specifying the “agreement first” principle

Follow the agreement if there is agreement and follow the law if there isn't

• Specifying the calculation standard for “net income” of achievement conversion by colleges, universities and research institutes

• **Net income = income – direct expenses during conversion**

(Direct expenses include taxes, patent application fees, patent annual fees, appraisal fees, etc., excluding R&D investment)

* The reward expenditure in the achievement conversion is not included in the yearly total performance wage of the colleges, universities and research institutes

5 Measures to solve technological achievement conversion problem

3. Measures to solve the “willing to convert” problem of universities

③ Tax incentive

Cash incentive

The 7-grade excess progressive tax rate on 3%-45% based on the “wage and bonus” is adopted
(Tax rate problem)

Equity incentive

Deferred tax policy
(Problems of the subject and process)

5 Measures to solve technological achievement conversion problem

④ Establishing the due diligence system for scientific and technological achievement conversion

Colleges and universities should establish the regulations to specify the democratic decision making procedures, reasonable care obligations and supervision and management responsibilities for achievement conversion.



3. Measures to solve the “willing to convert” problem of universities

5 Measures to solve technological achievement conversion problem

① Setting up a professional team and improving the ability of conversion services

Colleges, universities and research institutes should establish or specify the specialized agencies responsible for the achievement conversion

➤ Endowing functions



(1) Accepting the report of achievement R&D information release

(2) Analyzing the advisement application value

(3) Independently conducting or instructing or assisting in the follow-up test and development

(4) Applying for, managing and protecting IP

(5) Making and implementing the achievement conversion plans

4. Measures to solve the “willing to convert” problem of universities

➤ Fund guarantee

Colleges, universities and research institutes should set aside a certain portion of conversion income for supporting the operation and development of their own specialized achievement conversion agencies.

5

Measures to solve technological achievement conversion problem

4. Measures to solve the “how to convert” problem of universities

② Conversion mode (case)



“Investment first and division later” mode of Terahertz Technical Team of University of Shanghai for Science and Technology



“Division first and investment latter” mode of Optical Fiber Sensing Detection Technical Team of Shanghai Maritime University



Comments are
welcome!

Thanks!

November 07, 2017

Search for “Shu Ju Ren” WeChat official account

Thanks!

A decorative footer consisting of a solid blue horizontal band. Within this band, there are numerous semi-transparent, light blue squares of various sizes and orientations, creating a layered, geometric pattern.