

## Resource management of international scientific research cooperation in colleges and universities based on data analysis

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**Keywords:** Data analysis; International scientific research cooperation; resource management

**Abstract:** International cooperation and exchange is the main way for Chinese universities to achieve the strategic goal of building a world-class university. International scientific and technological cooperation is the main content and basis of international cooperation and exchange, and international scientific and technological cooperation is of great significance to vigorously promote the development of science and technology in my country. Based on practical experience and case analysis, this paper proposes that colleges and universities should strengthen the ability of overall management of international science and technology cooperation projects from three aspects: overall research direction, unified management of cooperation agreements, and overall preparation of international projects. Aiming at the main problems in the international scientific and technological cooperation and exchanges of Chinese universities, such as insufficient preparation of scientific research directions, imperfect agreement management system and measures, insufficient resource guarantee, and imperfect public service system, this paper analyzes the reasons, overcomes the existing problems, and strives to innovate And improve the system setting and system construction. The problems that need attention in the management of international scientific and technological cooperation and some feasible suggestions are put forward.

### 1. Introduction

Sino-foreign joint scientific research can unite domestic and overseas scientific research and innovation teams, cooperate with national key discipline projects, and inject a stimulant into the rapid development of the discipline. Sciences and technology are continuously developed through the joint efforts and mutual exchanges of human beings [1]. It is not an isolated cause, but a cause that affects the overall situation of the development of the national high-tech industry, the reform of the property rights system in colleges and universities, the innovation of knowledge in colleges and universities, the disclosure of scientific and technological industry information in colleges and universities, and the establishment of world-class universities [2]. Compared with the research universities in developed countries, there are still many deficiencies in talent cultivation, discipline construction, scientific and technological innovation, etc. [3]. At present, with the deepening of economic globalization, human beings are faced with more and more contradictions and problems such as economic growth, environmental protection, disease prevention and control, Internet development, etc., and the internationalization trend of science and technology is becoming increasingly prominent and prominent. Scientific research, especially the research of major projects in frontier fields, has entered an era in which all-round development can only be achieved through regional cooperation and even global cooperation [4]. Based on the existing framework, to obtain a more in-depth and self-consistent description of the natural landscape, we can only hope that the scientific frontier can be expanded on an all-round way for the micro and cosmological levels. Therefore, the way of big science is the only way [5]. Colleges and universities have gathered a large number of the best scientists, playing an important role in our country's international scientific and technological cooperation and exchange, and also achieved fruitful results [6]. It requires huge investment to build large-scale research facilities such as the Large Hadron Collider and the international thermonuclear fusion experimental reactor, and carry out "Engineering" large-scale scientific research.

Scientific research is not only an important way for colleges and universities to realize knowledge innovation, but also a necessary link between colleges and universities to cultivate excellent

innovative talents [7]. Therefore, we must fully understand the status and role of University industrial scientific research cooperation from the perspective of development and strategy. In addition to the support of national macro policies, industry university scientific research cooperation is inseparable from the establishment and improvement to the internal management and operation mechanism of the University [8]. International scientific and technological cooperation is one of the most prominent manifestations of scientific and technological globalization. It is necessary for countries and regions to learn from each other and absorb new scientific ideas, theories and advanced scientific research methods, track the world's cutting-edge scientific research directions, develop new scientific research ideas, avoid It is of great significance to repeat research at a low level, to ensure high-quality completion of scientific research projects, and to obtain international advanced scientific research results as soon as possible [9]. It is also necessary to focus on major research goals in a certain field, such as human gene mapping research, global change research, and other "distributed" scientific researches that are divided and collaborated by many scientists. Colleges and universities are the main force of scientific research and the base of talent training in my country. In this new era, how to play the role of "bridgeheads" in the process of "accelerating the construction of a powerful country in science and technology" has become an important task for colleges and universities in my country [10]. Therefore, how to carry out more in-depth, extensive and lasting international scientific and technological cooperation and exchanges in our country's colleges and universities has attracted great attention from the Chinese government.

## **2. The management system and system are not perfect**

### **2.1 Some colleges and universities lack specialized management institutions for international scientific and technological cooperation and exchange.**

Through the investigation of some colleges and universities and provincial education authorities, it is found that there are problems of multi-departmental management, unclear division of responsibilities, lack of perfect inter-departmental communication and unclear division of functions in international scientific and technological cooperation and exchanges in colleges and universities. The problem lies in the lack of professional talents in international science and technology cooperation and exchange management in colleges and universities. University management departments must consider the nature of university education, teaching and scientific research, have a global awareness, realize the utilization of external resources through international scientific and technological cooperation, and always serve the development of the university. The intellectual property rights of colleges and universities mainly include patents, trademarks, copyrights, neighboring rights, technical secrets, trade secrets, and computer software designs. Under the changing situation of science and technology represented by information network technology, biomedical technology, energy saving and environmental protection technology, based on sustainable development and long-term national interests, organizing or participating in international large-scale scientific research plans and expensive large-scale scientific research projects has become an international leader. It is an important way to improve the strength and level of domestic scientific and technological research. Personnel exchanges and training mainly include exchange of international students, joint training of postgraduates, and visits and exchanges of experts and scholars. "Going out and inviting in" are two important ways for Chinese universities to dispatch and introduce talents. The implementation of the national innovation and development strategy also puts forward higher requirements for scientific research innovation and personnel training in colleges and universities. As the main force of scientific research in my country, colleges and universities must re-examine the international scientific and technological cooperation of colleges and universities from a higher and broader international perspective. Based on the development stage and actual needs of our country, highlight the national strategy as the goal, and break the past thinking mode of only obtaining short-term results of scientific research results.

## 2.2 Some incentive and assessment mechanisms related to international scientific and technological cooperation and exchanges in colleges and universities are imperfect.

At present, many colleges and universities generally do not regard the performance of international scientific and technological cooperation and exchanges as the key assessment indicators for teacher promotion and subject evaluation, and lack corresponding talent incentive policies for international scientific and technological cooperation and exchange projects. Even for national projects such as 863 and 973, some colleges and universities do not have relevant incentive measures and management regulations. In order to strengthen the management of industry-university-research cooperation in the early, middle and late stages, universities in the United States, the United Kingdom, and Japan have established independent research and development centers and management institutions, and introduced corresponding incentive and assessment mechanisms. In order to avoid the leakage of confidential technical information and prevent improper protection of core intellectual property rights, university management departments need to master the overall information, and conduct strict preliminary examination and verification of cooperation agreements and personnel. Judging from the actual situation of this survey, researchers who participate in international scientific and technological cooperation and exchange projects are more recognized by talent incentive policies, and participants will pay more attention to evaluation, such as recognition of professional titles and financial support. With the development of the scientific and technological revolution and the wave of the knowledge economy, the spatial scale, investment intensity and complexity of the problems involved in scientific research continue to expand, and technology, talents, information, capital, services and commodities around the world are accelerating their development. International scientific research cooperation activities are unprecedentedly active, and universities, especially high-level universities with strong scientific research foundations, have become an important force in international scientific and technological cooperation. International practice has proved that actively carrying out international scientific and technological cooperation, cultivating high-level scientific and technological talents, introducing and digesting international advanced technology, and implementing re-innovation are the shortcuts for less developed countries to achieve scientific and technological leaps. On what measures should be taken, what management methods should be implemented, and how to encourage international scientific and technological cooperation and exchanges among colleges and universities, public questionnaires were distributed to most colleges and universities, and relevant questions and suggestions were put forward. The returned questionnaires were counted. The results are shown in Table 1.

Table 1 Statistics of measures that the state should provide in international scientific and technological cooperation and exchange in universities

Management measures	Centralized management and strengthening coordination	Increase investment	Smooth information	Increase intellectual property protection	Reward methods set by the state
Number of surveys	15	22	3	4	2
Percentage	65%	73%	24%	8%	5%

## 3. The current situation of China's scientific and technological cooperation and the existing problems of China's colleges and universities in the world: The layout of international science and technology cooperation plans led by the government lacks overall planning and coordination.

At present, the Ministry of Science and Technology, the National Natural Science Foundation of my country, the Ministry of Education, the Ministry of Industry and Information Technology, the Foreign Experts Bureau and other government departments have established some international

scientific and technological cooperation projects or platforms. Hosting or hosting international academic conferences reflects the overall international academic influence of the university or the international influence of the discipline and its scientific research strength. As a developing country, my country still lags behind developed countries in scientific research and teaching. The overall arrangement to carry out international exchanges and cooperation is an effective way to improve the level of scientific research and teaching in my country. Due to the lack of professional knowledge and skills of patents and technology licensing in American universities, the economic benefits of applying for and obtaining patents are very uncertain. Many universities rely on off-campus patent and technology licensing management companies for management. Therefore, technical cooperation and exchanges between universities and enterprises increasingly widespread. In many high-tech fields, universities and multinational enterprises have carried out global strategic cooperation in production, education and research. This requires us to have a global concept in the management of international scientific and technological cooperation, actively negotiate with foreign companies and off-campus patent and technology licensing companies, and try to achieve a unified plan for the direction and field of international scientific and technological cooperation, so that the two universities and even Chinese and foreign Cooperation between enterprises achieves a win-win situation. At present, most of the colleges and universities in our country are carrying out school building construction due to the expansion of enrollment, resulting in a shortage of funds, less research funds, and relatively little investment in international scientific and technological cooperation and exchanges.

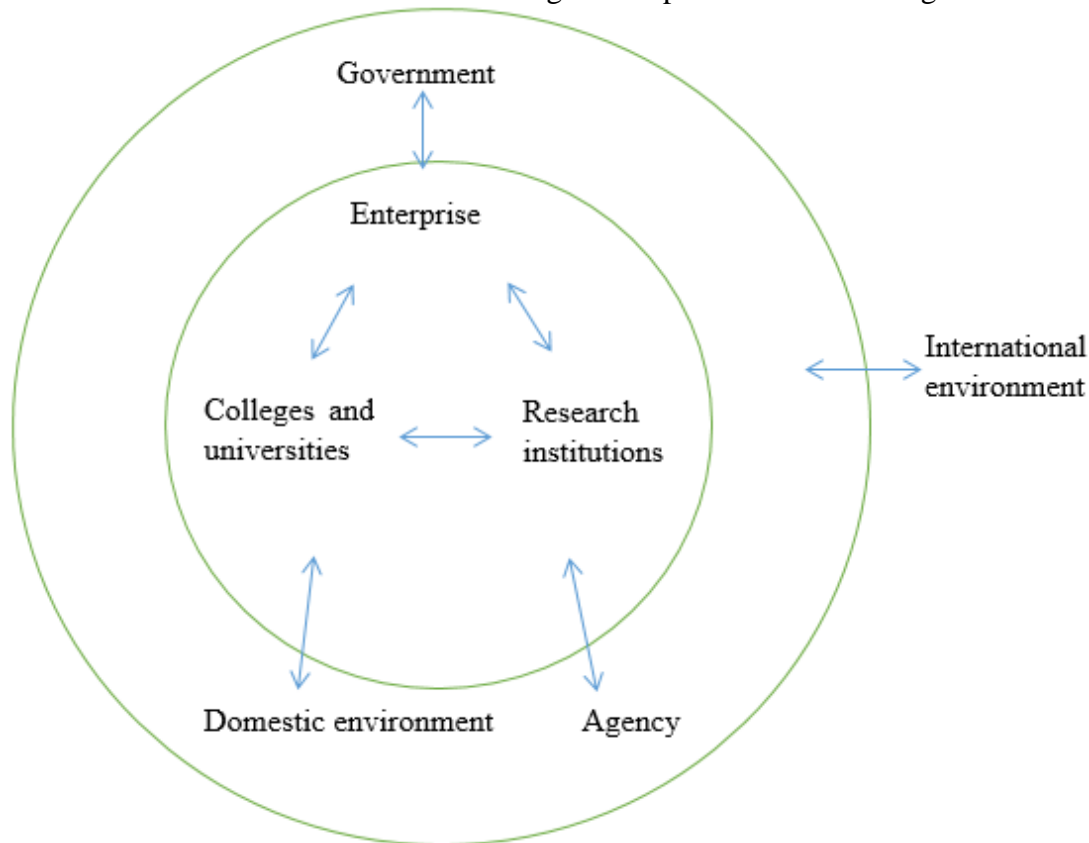


Figure 1 Basic structure diagram of national innovation system

#### 4. There is a shortage of scientific research talents who can participate in international competition and are familiar with international practices

Due to the long-standing tradition of the administrative scientific research model, coupled with the lack of willingness to collaborate among scientific researchers, it is difficult to form a large and powerful scientific research team. At present, Chinese universities have the ability to participate in international competition, and the talent pool familiar with international practices is still weak. In addition to the Ministry of Science and Technology, the Chinese Academy of Sciences, the China

Association for Science and Technology, the Chinese Academy of Engineering, the Ministry of Education, the State Administration of Foreign Experts Affairs, and the Ministry of Industry and Information Technology also have financial support for talents in international scientific and technological cooperation projects, but the proportion is small. The school always holds a relatively fair and stable scale when reviewing agreements and talents, so that local interests are subordinate to the overall interests, and individual cooperation is prevented from hindering or affecting the school's strategic cooperation planning. In terms of operating procedures, under normal circumstances, on-campus inventors first report their inventions to the on-campus Patent Office or Patent Committee, and the off-campus management company then submits relevant documents to the off-campus management company. The off-campus management company evaluates the invention and decides whether to apply or transfer it. patent. In addition, the Chinese Academy of Sciences, the Chinese Academy of Engineering, the China Association for Science and Technology, and most provincial and municipal governments have successively established international scientific and technological cooperation projects and platform funding plans. Chinese universities send a large number of personnel to participate in international cooperative research and development every year, and also carry out cooperative research and development by setting up joint research laboratories in Chinese universities. Therefore, actively striving to hold international academic conferences to attract top academic talents is another important way for the scientific and technological circles of Chinese universities to seek cooperation.

## 5. Conclusions

Practice has proved that the management of intellectual property rights by institutions is more conducive to the transformation of scientific and technological achievements in universities. The disadvantages of managing personal intellectual property rights are: teachers have no time and energy. If there is no uniform and reasonable calculation method and explanation channel for the budget of international scientific and technological cooperation, it will lead to the partners' distrust of the overall management system of universities and affect the sustainable development of cooperative relations. An efficient resource integration mechanism can enhance a country's technological innovation capability. On the basis of effectively integrating the scientific and technological resources of various departments and universities, the educational administrative departments should focus on building a public service platform for international scientific and technological cooperation and exchanges in universities. It is undoubtedly of great practical significance of improving the level of scientific research and industrial development in colleges and universities and realizing the important functions of colleges and universities in promoting national economic and social development. For applied international scientific and technological cooperation in which basic scientific theories or advantages are not obvious, the intellectual property protection strategy and management system of research results should be established and improved, and the awareness of protection for scientific research results from independent intellectual property rights should be strengthened.

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