

## Study on the Strategy of University-enterprise Cooperation of University Under the situation that enterprise is the innovation main body

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**Abstract.** Under the situation that enterprise is the innovation main body, universities should locate its position in the national innovation system and play their proper role as soon as possible. Enhancing university-enterprise cooperation is the inevitable choice to adapt to the innovation-driven development strategy and it can provide better service for national major strategic needs, and it is an important path to realize the sustainable development for university. For universities, the traditional model of school-enterprise cooperation is difficult to adapt to the current situation of science and technology in terms of the concept and mode of cooperation and incentive assessment system currently and the further development of school-enterprise cooperation is restricted. In the paper, the status and problems of university-enterprise cooperation are analyzed, and the development strategy of university-enterprise cooperation is presented for university.

### Introduction

University-enterprise cooperation refers to cooperation between universities and enterprises in order to play the advantage of each other better, and the two sides achieve win-win development through sharing resources and advantages, and it is an effective means of promoting science and technology, economic and enterprise development. Cooperation contents include technological Innovation, personnel training, and achievements transformation jointly, etc. Cooperation forms include technology research, technology transfer, undertaking national science and technology plan jointly, building research lab and platform, personnel training and so on. Joint innovation of university and enterprise has become one of the important mode of fostering innovation [1-2].

Currently, China is deepening the mechanism reform comprehensively to accelerate the implementation of innovation-driven development strategy, and the market will play a decisive role in the allocation of resources. Enterprises have become the main body of technology innovation, R & D investment, research organizations and achievements transformation. Regional technology innovation ability is improved through industry-university-research cooperation taking the enterprise as the innovation main body, and it is a major strategic path to optimize resource allocation and improve innovation efficiency for the world's major developed countries.

Under the situation that enterprise is the innovation main body, as the main force of promoting technological progress and innovation force, universities need to change the traditional concept and identify the position itself in the national innovation system as soon as possible. Through industry-university-research cooperation, a close working relationship with the industry and competitive enterprises is established, then universities can maintain the vitality of innovation and sustainable development.

### Development status of university-enterprise cooperation

In the science and technological innovation system, universities and companies have significant resources complementary and the cooperation of the two sides promote the transformation of science and technology into practical productive forces effectively. Different develop modes are formed in the practice of university-enterprise cooperation [3]. In USA, Most of the major high-tech industries have established a cooperative relationship of innovation with universities in different degrees. Research Triangle Park in North Carolina and Silicon Valley are the practical results of university-enterprise cooperation [4]. Development of American universities follows three major development strategies, and that is the combined strategy of universities and academy of sciences, closely cooperation strategy of university and enterprise, and the strategy of science and engineering combination and arts and sciences penetration in the university [5]. As one of the three strategies, university-enterprise cooperation promoted industry-university-research cooperation greatly. Research projects are sponsored and shared by the university and businesses. Research achievements will be applied directly to product development in general. Topics of these studies are for technical problems with the universal in an industry directly. Berkeley of University of California, Harvard, MIT and Stanford University are successful example of industry-university-research cooperation. These measures make American universities involved in enterprise technology innovation extensively. Japanese government regards industry-university-research cooperation as a basic national policy, and universities and enterprises are required to implement it seriously [6]. University-enterprise cooperation is encouraged in the following areas such as legislation, funding, preferential policies, propaganda and guidance, achievements transformation and other aspects. A lot of high-tech enterprises set up their R & D center of products in the university, and improve the technological content of their products through scientific research platform of universities. Advanced technology research center of Tokyo University was founded in 1987, and it aims to the industry-university-research cooperation in high-tech areas of interdisciplinary, and it implemented "the apex science and technology open laboratory facing human and society "program. Intellectual property department and technology incubator are set up in the center, and the university-enterprises laboratory is built, such as Fuji Electric laboratory of Toky University.

Since the eleventh five-year plan, the CPC Central Committee issued a series of major decisions in order to promote research cooperation and implement strategy of innovation-driven development. National long-term Science and Technology Development Plan (2006-2020) proposed that the national innovation system with Chinese characteristics should be promoted, and the construction of technical innovation system through industry-university-research cooperation is taken as the breakthrough that promote the national innovation system. "Some opinions of the Central Committee of CPC on deepening the reform of the system and mechanism to speed up the implementation of innovation driven development strategy" proposed that enterprises become the main force of technological innovation and the right to speak is expanded in the national innovation decision-making. High-level and regularly dialogue system of technology innovation and consultation of enterprise is established and the important role of enterprises and entrepreneurs should be played in the national innovation decision. As an important form of innovation-driven development, university-enterprise cooperation has been positioned to the strategy height of national innovation by the CPC Central Committee.

With the development of China's economic, reform deepening and increasing power of technology, university-enterprise cooperation is becoming the conscious behavior of complementary advantages and benefit-sharing between universities and enterprises [7]. University-Enterprise Cooperation Committee was established in Tsinghua University as early as 1995, and now it has nearly 200 member units at home and abroad and united research institutions were set up with more than 20 member units. The united research institute was co-built by Tsinghua and China 22Mcc Group Cooperation Ltd, the two sides developed the large press equipment together in the institute, and a number of achievements filled the gap in China. Beihang University promoted the advanced industrial partner program strongly through the deep cooperation and comprehensive collaboration with the industries and enterprises, and now it has carried out comprehensive cooperation with the Aviation Industry Corporation of China (AVIC) and China Aerospace Science and Technology

Corporation. Beijing Jiaotong University developed the GSMforRailways (GSM-R) system with the Qinghai-Tibet Railway Company together. Shanghai Jiaotong University developed own brand cars with Shanghai Maple Automobile Co. Ltd together.

### **Problems in the university-enterprise cooperation**

University-enterprise cooperation has made important contributions for enhancing China's capability of independent innovation, but there are still some gaps in the cooperation scale, efficiency creation and other aspects comparing with developed countries [8]. There exist the following major problems.

**Lack of awareness to the situation that enterprise is the innovation main body, and lack of initiative.** In the new situation, with the continuously pushing forward of the mechanism reform, the role and participation of university in national technology plan will shift, and sources of funding and financial structure will change with the shift. For university, how to locate its position in the national innovation system and adjust the collaboration way and direction of the researcher, it need to be thought by relevant administrative departments and every researchers. Currently, the university administration is adjusting the strategy and overall plan, but individual researchers has not realized the gravity of the situation and most of them has not changed the ideas to actively respond to the new changes in the situation that enterprise is the innovation main body.

**Pay more attention on theoretical research and less on practical application, low correlation with the market demand.** Since undertaking the task entrusted to society and government, universities received more government funding, and they paid less attention on the demand of enterprises. Teachers' research activities usually pursue advanced academic achievement as the goal, focus on theory and technological breakthroughs, but they are out of touch with the needs of industry and has low correlation with the market demand [9-10]. On the other hand, after concluding research projects, research results are often shelved and achievements transformation is little. The application of achievements in industry is ignored, and it is a waste of intellectual and scientific resources.

**Cooperation mode is single and comprehensive cooperation is insufficient.** Research universities have begun cooperation with enterprise from long ago, from past technology development, technology transfer, technical consulting and technical services to the current forms of research cooperation. But most of the cooperation belongs to the type of passive reaction. Deep cooperation is less, cooperation mode is single and the level is low. Long-term and stable cooperative relations with enterprise is less established. On the other hand, cooperation resources cannot be effectively integrated, and power cannot concentrate. This results in less cooperation with industry leading enterprises and lower cooperation strategic height. For the university, the single cooperation mode cannot promote scientific and technological innovation and transformation of effectively and the dominant position leading the development of the industry is not formed.

**Incentive mechanism is not perfect, and the enthusiasm of university-enterprise cooperation cannot be stimulated.** In university, evaluation system of job classification, year-end assessment and other aspects for teachers pays more emphasis on national science and technology projects. This guide makes researchers pay more attention to the national projects and less attention to the university-enterprise cooperation. The researchers pay close attention to the subject value level, the number of funds, the amount, the ability to output a high level papers and other factors, and they focus on the application and implementation of project and lack the enthusiasm for university-enterprise cooperation. On the other hand, the carrying out of university-enterprise cooperation lack the institutional guarantee on decision-making, and the industry-university-research cooperation mechanism oriented by market is not formed, and the enthusiasm and initiative carrying out applied technology research and achievements transformation are restricted. For example, few corresponding system is formulated specially for industry-university-research cooperation fund, university-enterprise cooperation platform and innovation alliance. Since there is no perfect evaluation index and evaluation system, this management model weakened the enthusiasm of researchers engaged in university-enterprise cooperation to a certain extent.

## **Development strategy of university-enterprise cooperation of university**

**Tap the resources of the existing university-enterprise cooperation, and enhance the level of cooperation.** In university, there are a lot of research teams having long-term cooperation relationship with some enterprises, but most of these cooperation maintains in the stage of signing a contract every time according to the specific needs of the enterprise, and deep cooperation relationship through constraints of the specific protocol is less and community of interests of university-enterprise cooperation is not formed. For this reason, universities should fully sort out and analyze the existing cooperation basis with the enterprises, and guide and mining resources relying on the existing stock actively, then the single horizontal cooperation is hoped to be promoted to a long-term cooperation that is stable and normal. Universities can establish deep cooperation relationship with enterprises through signing strategic cooperation agreement, co-building laboratories, participating in industrial technology innovation alliances, and these measures will make them become the preferred partner of technology innovation of enterprises.

Through the establishment of strategic cooperative relations with industry competitive enterprises, universities can enhance their competitiveness and market sensitivity to industry and occupy the cooperation opportunities; through co-building laboratories, universities can get sustained investment from enterprises in technological innovation, make their research closer to the market demand, and shorten the conversion cycle of achievement research; through participating in industrial technology innovation alliance, universities can be integrated into the organization of technological innovation consists of enterprise, government and research institutions and other components, and carry out technological innovation jointly. In the situation that national science and technology plan is led by enterprises, through deep cooperation with enterprises, universities can broaden the application channels effectively and participate in national science and technology projects with enterprise together, then they can serve major national strategic needs better and occupy a place of their own in science and technology planning system.

**Build the university-enterprise collaborative innovation platform, and strengthen the innovation ability through looking for growth.** Strengthening the collaborative innovation among different innovation body such as universities, research institutes and enterprises is an important way to improve the national innovation capacity and speed up the innovation system building. Universities should give full play to its advantages in basic research and key technology research, and support the technological innovation system that enterprises is the innovation body. Combining with the advantages of their own academic strengths and research infrastructure, universities should increase the intensity of resource sharing and integration through building collaborative innovation platform with industry competitive enterprises and research institutes, etc.

Through setting up different levels of collaborative innovation platform, scientific and technological innovation and industrial upgrading of the enterprises can be driven and participated in by universities substantively. First, through the construction of university collaborative innovation platform, more and more collaborative innovation partner is gathered and various resources are brought together, while creating collaborative innovation environment and atmosphere, then the foundation is laid for applying for the provincial and national collaborative innovation platform. Secondly, industrial technology innovation platform is established based on university-enterprise cooperation laboratory. Cooperation scale is enlarged and technology radiating form is broaden. Industrial technology innovation platform plays a guiding role in the development of the industry, and closed-loop system from technical innovation to the industrialization is formed. Third, based on the integration of resources and support innovation, university can lead or participate in the construction of national collaborative innovation platform, such as the 2011 Collaborative Innovation Center, the National Manufacturing Innovation Centers and other provincial collaborative innovation center, and then fully participate in the innovation community building of industry-university-research cooperation.

**Improve the incentive and evaluation mechanisms for stimulating endogenous power.** In order to encourage university-enterprise cooperation, evaluation mechanisms should be improved

from the following aspects. In terms of research project management, in order to encourage teachers to participate in the cooperation with enterprise, the major university-enterprise cooperation projects should be given similar weights similar with the vertical subject when calculating workload, and the project management fee of industry-university-research cooperation fund should be reduced appropriately. Tracking and service of university-enterprise cooperation projects should be strengthened at the same time. In terms of university-enterprise cooperation platform, appropriate support conditions should be introduced to encourage the cooperation. For example, university-enterprise cooperation laboratory can be taken as the platform to introduce full-time research staff, and its graduate enrollment should be increased accordingly. In terms of the achievements transformation, the use, disposal and revenue management approach of scientific and technological achievements should be promulgated as soon as possible combining the latest "the law of promoting scientific and technological achievements transformation of People's Republic of China". Approval basis of the achievements transformation should be explicit more, the income gains of the inventors should be improved in order to encourage inventions and other intellectual creation. Finally, these three aspects are appraised as an important basis for the job evaluation and title assessment. Through the above four initiatives, enthusiasm of university-enterprise cooperation is enhanced and the endogenous dynamics of universities is stimulated.

**Expand cooperation channels, and promote university-enterprise cooperation comprehensively.** First of all, technology promotion and advertising should be pay more attention, the scientific and technological achievements and research capabilities of universities should be understood by enterprises through a variety of channels, such as the communication mode of "Please come in and go out". Teacher should be organized to visit the enterprises and learn about the needs of enterprises, and this will make the technological innovation close to the needs of enterprises more. On the other hand, the enterprises should be invited to the laboratory of the university, and they will understand the achievements of the researchers fully. Secondly, personnel training and exchanges should be strengthened, such as high-level personnel training PhD, Master of engineering with the enterprise business jointly, and regularly scientific and technical personnel exchanging mechanisms of the two sides should be established too. Third, promotion and service of the university-enterprise should be strengthened. Management department should organize the researchers to participate in industry-university-research activities such as matchmaking and technology exchange fair. Through building the network information platform of technology jointly with government and enterprise, promotional efforts of scientific and technological achievements are increased. Professional services can be provided relying on intermediary service agencies, and it can further accelerate the promotion and conversion of technological achievements.

## Summary

Currently, a new round of global technological revolution and the industrial revolution is in progress. China is deepening the mechanism reform comprehensively to accelerate the implementation of innovation-driven development strategy, and the market will play a decisive role in the allocation of resources. Enterprises have become the main body of technology innovation, R & D investment, research organizations and achievements transformation. In the reforming, the development path of research universities need to be thought deeply. Research universities must adjust its development strategy to adapt to the new situation as soon as possible. In the paper, the problems of university-enterprise cooperation in the current situation are analyzed, and the development strategy is presented for university. It is hoped to further promote innovation and personnel training ability of university, and support the building of the national innovation system.

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