

# Analysis of Institutional Innovation's Impact on Chinese IUR Collaboration Development

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**Abstract** Industry-University-Research (IUR) Collaboration is now faced with many non-technical problems, which are expected to be solved by institutional innovations. This paper analyzed the dilemma in IUR Collaboration development process based on listing major problems exist in China IUR Collaboration operation, demonstrates the subject, methods and content: the nation is the subject in institutional innovation, and institutional innovation should be conducted mainly by a step-by-step manner and supported by radical manner. The content of institutional innovation includes: legal system, tax system, property system, incentive system and related financial system. This paper also suggests that in the development of IUR Collaboration, the arrangement and innovation should be scientific and rational, thus through the institutional innovation can play an active and effective role in the transfer of socio-economic development model.

**Key words** Institutional innovation; Industry-University-Research Collaboration; Analysis

## 1 Introduction

In the era of knowledge economy, the world attaches great importance to how science and technology can be quickly transformed into practical productive forces, to facilitate high-tech commercialization, industrialization and internationalization. In 1993, UNESCO adopted the plan UNISPAR (UNISPAR is the abbreviation of University-Industry-Science Partnership). Which are the universities, enterprises and scientific research cooperation programs, to encourage cooperation between universities and enterprises involved in the process of industrialization, to attract industry and universities, enterprises and research institutes to carry out joint grow. IUR Collaboration becomes the mainstream technological innovation model of the world. Countries such as United States and Japan have adopted a national Research Strategy Alliance to accelerate science and technology to take off. Most famous example is the "Silicon Valley" miracle in mid-20th century, made by Stanford University as a representative. Japanese government attaches great importance to IUR Collaboration, strongly advocated the so-called "Government-Industry-University-Research Combination", "trinity" mobile research organizations such as the "Tsukuba Science City". The government actions played an important role in IUR Collaboration. Since 1980s, China has also attached great importance to IUR Collaboration, and promulgated and implemented the "National Science and Technology Award Principle" "The People's Republic of China's Facilitation of Technological Achievements Transfer Law" "Technological Progress Law," "Patent Law" and other related legal system. The creation and implementation of these systems for IUR Collaboration created a good environment for development, and some results were achieved.

In the era after the economical crisis, Chinese companies face fierce competition in international market, they need technological innovation to seek a new direction of enterprises development, but often cannot find good research results and investment projects. In particular, companies need to master the key technology development to improve the enterprise's core competitiveness. IUR Collaboration Model has shown its role, but which is the key issue influences China's IUR Collaboration, technical or non-technical? This paper analyzed as follows.

## 2 Major Problems Exist in IUR Collaboration Development

### 2.1 Benefit distribution

In essence, IUR Collaboration is three main subjects (enterprises, universities and other research institutes and government) of technological innovation which in accordance with the interests of sharing, risk sharing, complementary advantages and mutual development collaborate on technology innovation to gradually realize a form of virtuous research-product-market-research circle. However, in some IUR Collaboration cases, companies are highly motivated, universities and research institutions also provide good technology, but the processes of cooperation are very difficult. One important reason of this phenomenon is that the interests of the parties have not been handled well in IUR Collaboration

development. As the three cooperation parties are in different systems and areas, their views of benefit distribution are quite different, so contradictory is often produced and they are difficult to be coherent. If this issue cannot be properly handled, the organizations in cooperation will not win the benefits they deserve. (Lu Haiping 2004)<sup>[1]</sup> and some other researchers find two important phenomena: one is the universities, research institutions that carry out a combination of research believe the benefit distribution is unreasonable in cooperation with enterprises that they are at disadvantage in co-operation negotiations; another is the enterprises think that immature technology supply is the biggest barrier in IUR Collaboration.

### **2.2 Market-orient issues**

For a long time, China's science, technology, education and economy have not yet been closely integrated. The value of scientific research is determined based on amount of national funds, the number of published papers, the academic status of participants, level and number of awards received. This rating system highlights the "technical merit" of scientific and research achievements, but the "market value" has been largely ignored, resulting in no market-oriented research, technology supply and lags far behind market demand. The CYIT case is a true portrayal. CYIT proposed 3G standards to the International Telecommunication Union (ITU) early in 1998, two years later was admitted to the turn of the century and became one of the 3G standards, but it missed the best opportunity in local TD development. CYIT met the crazy industry criticism in the process of TD development; on the capital injection side, the failure of co-operation with Hong Kong investment group and COMMIT events made CYIT into financial crisis. This forced people to think of the school-owned CYIT got problems in market-orient mechanism. Fortunately, the intervention of government action in June 2008, bringing 21.8 billion of capital, and accelerated CYIT's restructuring, helped to make the market orient clear among school-owned enterprises<sup>[2]</sup>. This shows universities and scientific research projects are not market-oriented, but guided by their academic goals. Technology projects which are not market oriented are very likely to be detached, so that its market value cannot be brought into play, result in "unsalable". And also, because of the imbalance of benefits and risks, some researchers and universities, research institutions will not choose to make industrial production transformation, so the final result is that many project achievements have been shelved and become history.

### **2.3 Government coordination and guarantee**

View from the IUR Collaboration process, as the status of cooperation parties vary in different stages, thus the influence of IUR Collaboration on them are different. IUR Collaboration some ways can be seen as a systematic project; to make it run smooth the scientific decision-making system and an integrated service platform are necessary.

From the government perspective, there are four main reasons for problems exist in IUR Collaboration. First, the government policy support of IUR Collaboration is not enough. Currently China has not yet carried out the policy to accelerate IUR combination, the importance of IUR Collaboration in post-economic crisis era has not be paid attention by the government, and there is no clear and operable support policies and laws, regulations on tax, credit and similar fields. IUR Collaboration is lack of complete series of support measures on personnel mobility, well-paid salary, intellectual property ownership, title assessment, individual rights, equipment sharing, etc. Second, government investment is not enough. From 2003 to 2007, China's research and development expenses increased year by year: 2003 was 18.601 billion U.S. dollars, increased to 48.77 billion U.S. dollars in 2007; research and development expenses in the proportion in the GDP increased from 1.13% in 2003 up to 1.49% in 2007. Nevertheless, the Government spending on national research and development remains low, especially in the proportion of GDP<sup>[3]</sup>. Up to now, the state did not set up special funds to support IUR Collaboration. Third is difficulties in social financing. Due to lack of positive and definite government guidance, infected by the product testing and high-risk in industrialization, Subject to product testing and industrialization of high-risk, enterprises, financial institutions or venture capital are not willing to invest in IUR Collaboration and research achievements transformation. Fourth, the construction of science and technology intermediary service platform is delayed, thus the industry, university and research are not closely linked. Although there has been a lot of science and technology intermediary service institutions, such as high-tech achievements transformation service centers set up in different places, they play an important role in communication between research institutes and enterprises, but most of them are single-function intermediary service organizations still not perfect in operation, the quality and level of services provided awaiting to be improved. Also, the status and benefits of intermediaries are not effectively protected, which to some extent hindered the development of intermediary institutions.

## **2.4 Mechanism for cooperation development**

Compared with developed countries, China's IUR Collaboration development was slow and inefficient. This is directly related with the incomplete mechanism. Main features: First, from the perspective of scientific research units, IUR Collaboration dynamic mechanism is not perfect, there are gaps between research and market demand, technology and market; transformation rate is generally less than 20%<sup>[4]</sup>; Second, the construction of modern enterprise system is not perfect, which restricted the companies to absorb new technologies and talents, make enterprises cannot become economic entities who truly rely on scientific and technological progress and development; Third, without a complete technical value assessment system, in many cases the distribution of benefits in IUR Collaboration are unfair, make the task of intellectual property protection arduous. Fourth, the legal system of science and technology is lagged behind, and sometimes the implementation of existing laws and regulations is not in place.

## **3 Subject, Method and Content of Institutional Innovation**

### **3.1 Content of institutional innovation**

In IUR Collaboration, the three main bodies are enterprises, universities and research institutions, and government. However, in the process of institutional innovation, government is the subject; it is the organizer of institutional innovation, as well as the supplier of IUR Collaboration. Being driven by imbalance force of different social parties, government intervention in IUR Collaboration becomes ore necessary. This is because institution is a public product, institution construction is the basic duty of government, and it represents long-term interests of whole society. Institution innovation is a continuous complex systems engineering, and the investment must be kept going, which enterprises, universities or research institutions cannot afford. To build an equal, voluntary, mutual benefit, open innovation system, and adjust the system to environment, this process should be realized under national-level encouragement<sup>[5]</sup>. Therefore, from the national side, develop institutional innovation result in IUR Collaboration is an external profit, the subject of innovation is the nation, the result is transformation in institution environment, which motivates IUR Collaboration and effectively lead to different parties' benefit from institution innovation, thus achieve healthy and orderly development of IUR Collaboration.

### **3.2 Methods of institutional innovation**

In institutional innovation theory, there are two ways: radical and progressive. Radical requires overall innovation on the existing constraints of development goals in a short time, while the progressive way is taking marginal incremental evolution method. These two ways differs in cost, time and risk. The development of IUR Collaboration China should be mainly progressive and supported by radical manner. Main reasons are: First, technical constraints exist in IUR Collaboration development, however technological innovation have to be achieved a through development process. Second, a number of interest groups are involved in IUR Collaboration development which makes it a complex game process, and radical way of institution innovation brings high cost and risks. Third, IUR Collaboration is a certain result of the social and economic development. It is a complex system built on the base of progressive process.

### **3.3 Content of institutional innovation**

Institutional innovation includes: First, the legal system. Legal system is the basic system to promote the development IUR Collaboration. It regulates individual behavior, clears all responsibilities and obligations of government, enterprises in IUR Collaboration development, and makes this development in accordance with the laws and market disciplines. The build of legal system includes the establishment of both comprehensive and special research cooperation law and regulations of IUR Collaboration and other laws and regulations which can promote the three aspects of the IUR Collaboration. Second, the tax system. Tax system is the most direct means to realize IUR Collaboration; it changes the system environment and brings the external benefits. Third is property rights system. Property rights system is the basis to make responsibilities clear, change the external costs and revenue of technological achievements to internal. It is also a basic protection for IUR Collaboration. Fourth is the incentive system. Incentive system is an effective means to promote and guide the IUR Collaboration in the production, distribution, exchange and consumption areas. Fifth is the relevant financial system. Financial system is the support method of IUR Collaboration development, as well as an essential institutional arrangement for IUR Collaboration.

## **4 Analysis of Institution Innovation's Impact on China IUR Collaboration**

### **4.1 IUR Collaboration is not only converting from one mode of production to another mode of production, it is an institutional innovation process, which requires rearrangement of the existing institution**

In New Institutional Economics, the four elements: labor, capital, technology, and institution constitute the relations of production. Technology is the chosen result of IUR Collaboration, labor the required result to meet the technical efficiency of production, capital is the universities (research institutions), businesses to ensure research, operation and further pursuit of profit, the institution is the element to regulate behaviors in IUR Collaboration. IUR Collaboration development requires technical innovation and institution innovation; both technology and institution are indispensable. It should be noted, the current IUR Collaboration in China is still in extensive stage, the construction of institution is lagging behind. On IUR Collaboration, the author believes that the institution is more important than technology, technological innovation without institution protection is hard to support sustainable development of IUR Collaboration, if only technological progress, if there's only technological progress, but no scientific and effective institutional arrangement, even the most advanced technology can only be shelved, let alone promoting IUR Collaboration development.

### **4.2 Institution innovation can coordinate the interests in IUR Collaboration process**

IUR Collaboration is a new model of economic development, which will inevitably bring new interests and the chain of interests, such new interests and the chain of interests cannot be effectively integrated by the traditional economic operation mechanism, it needs to be coordinated by a new integration mechanism of interests and institutional framework. Therefore, IUR Collaboration development must be conducted by institutional innovation, to establish a system which will benefit the interest distribution and integration in IUR Collaboration.

### **4.3 Institutional innovation helps to regulate the economic behavior of market players, to meet the objectives of sustainable development**

Institution is mandatory and binding rules, which can be achieved through laws, regulations, organizational arrangements and policies. Institution draws up a border of proper behaviors, and it tells people what they can and cannot do. IUR Collaboration asked universities (research institutions), and government to change their habitual thinking. Institution is necessary for this change. There are a considerable part of people's behaviors under their familiar traditional economic behavior is contrary to the object of IUR Collaboration. To change these behaviors and adjust them to the requirements of IUR Collaboration development, institution innovation is required to regulate and restrain people's behavior.

### **4.4 Institutional Innovation has a motivating and guiding role on behaviors required by IUR Collaboration development**

In the process of IUR Collaboration development, the institution is a continuous, standardized incentive. Incentive of institution is achieved mainly through the internalization of external benefits. IUR Collaboration should be a social activity with high rate of return, but under the current institutional arrangements, the parties in IUR Collaboration have not enjoyed high revenue. Institution which is good for IUR Collaboration development should be able to continuously improve the yield of the parties. Once such institution is established, people will consciously choose IUR Collaboration.

### **4.5 Institution innovation can reduce technology innovation transaction costs which occur in IUR Collaboration**

In the system of innovation theory, outside income is a predisposing factor in institutional arrangements innovation, institutional innovation is a means to obtain external benefits, institutional innovation must be done under the condition that the external income is greater than the transaction costs of institutional innovation in IUR Collaboration. Good institutional arrangements can reduce the uncertainty of economic activity, inhibit "economic man" opportunist deviations, provide a stable and expected reduced transaction costs, promoting technological innovation and progress, industrialize technology, and facilitate the sustainable development of IUR Collaboration.

### **4.6 Coordinate the relationship between the government and the market**

As a new mode of economic operation, IUR Collaboration is inseparable from the market; build a market-friendly environment is a precondition for IUR Collaboration. Government as the main institution supplier should strive to solve the problem of insufficient supply of institution, build up the market mechanism for IUR Collaboration and reshape the market rationality. Stressed that the Government in the leading position of IUR Collaboration does not mean government is important than market. The sustainable development of IUR Collaboration ultimately depends on the market. Here the

role of government is mainly to improve the market by institution, then join forces of government and market.

## 5 Conclusion

IUR Collaboration in China starts quite late: it develops slowly with regional imbalances, and relatively poor efficiency. Today science and technology develop rapidly, strengthen IUR Collaboration is a necessary requirement to build an innovative country and encourage independent innovation, as well as an important measure to change the way the economic develops. Through the analysis above, we can see that IUR Collaboration development faces many non-technical problems and needs to break through institutional innovation. Government should lead institutional innovation, because at this period, only in government-led model can IUR Collaboration be developed actively. Increase state investment in infrastructure construction through institutional innovations to build a basic environment; create an atmosphere of innovation to provide a good soft environment; Implement various preferential policies to attract the participation of all parties in IUR Collaboration; enact laws and regulations to protect the smooth R & D activities; take the advantages of institution innovation, to solve the problems in IUR Collaboration and play an active and effective role to make changes in socio-economic development pattern.

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