

The Construction of Enterprise Education System in Higher Learning Institutions Based on Industry-University-Research Collaborative Innovation

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Abstract. This paper analyzes the theoretical mode, strategic significance as well as policy direction of Industry-University-Research collaborative innovation in order to find the integration point between enterprise education and Industry-University-Research collaborative innovation. It then introduces the construction means of enterprise education system from such five aspects as objective system, curriculum system, security system, environmental system and evaluation system.

1. Introduction

To improve education quality of higher institution, great efforts should be made in talent nurturing, scientific research, social service and cultural inheritance and other innovative undertakings. We should actively promote collaborative innovation. Through the system innovation and policy guidance, colleges and universities are encouraged to enter into in-depth collaboration with scientific institution and businesses forming strategic alliance of collaborative innovation.^[1] It has become the top design of national strategies and system project involving multilateral joint action. A favorable social and political environment has taken shape. Collaborative innovation shall be the decisive measure for the construction of new countries, the path to win-win cooperation between higher learning institution, scientific institutions and enterprises for greater sustained development capacity and the choice for sustained and healthy rapid development.

Implementing enterprise education and cultivating innovative entrepreneurship is a global trend of education development and reform, and also an important part of quality education and innovation education of college students.^[2] In recent years, colleges and universities have generally injected the concept of enterprise education, made continuous efforts in strengthening enterprise awareness and ability and encouraged college students to start their own business. Certain progress has been achieved. However, entrepreneurship cultivation is a long-term systematic project. Although a great many universities have introduced some management practice and incentives, concerted efforts still lacks on the whole and systems and foresight and standards remained to be seen in enterprise education. In the context of collaborative education, how to improve the effectiveness is an important subject faced by the higher learning institution. Therefore, a complete enterprise education system based on collaborative innovation is called for to deepen the enterprise education in colleges and universities.

2. Theoretical Mode, Strategic Significance and Policy Direction

2.1 New Theoretical mode of I-U-R Collaborative Innovation

I-U-R Collaborative Innovation refers to a collaborative innovation of technology development where enterprises, universities and scientific institutes invest their respective resources and capacities and governments, scientific service agencies, financial institutions and other relevant

subjects offer their collaborative supports.^[3] With complementarities in their resources and advantages, all parties shall participate, share the fruits and risks and together conclude the agreement on work division to complete a new technological innovation. In this research and development cooperation, enterprises serve as the technical demand side and universities and scientific institutions as the technical supply side. I-U-R collaborative innovation takes advantage of rapid interaction, sharing and integration to accelerate the efficiency of local and national systems at the level of strategy, knowledge and organization collaboration. The core of the collaboration is strategy-knowledge-organization.^[4] Support layer is governments' policy guidance, project driven and institutional incentives. Auxiliary layer is the intermediary agencies, financial institutions and other organizations (e.g. venture capital). The process and mode to be chosen depends on the interest distribution mechanism, cooperation history, organization relation as well as business' absorption ability, innovation complexity and industrial environment.^[5] Collaborative innovation is an important management innovation in its nature different from coordinated cooperation of original innovation process and integrated innovation that introduces, digests and absorbs the product technical elements. It is an integral part of depending on scientific advance, workforce quality and management innovation to promote economic development.

2.2 Strategic Significance of I-U-R Collaborative Innovation

Collaborative innovation is the new trend of scientific innovation activity of our world and effective way to integrate innovative resources and to enhance efficiency.^[6] Over sixty years after the founding of new China, especially over thirty years after the reform and opening up, great achievements have been made in scientific undertaking and comprehensive national power has been greatly strengthened with significant development in original creation, integrated innovation and innovation through reverse engineering. Meanwhile, it should be noted that our country, though a big economy, not a economic power due to its poor creativity. Compared with developed countries, there is still a big disparity in overall technological level and shortcomings in institutional mechanisms. For example, business has yet to become a truly innovative body and has poor creativity; scientific strength of all aspects is self-contained, scattered and repeated, thus resulting in low overall efficiency.^[7] Scientific macro-management functions in its own way and distribution of scientific resources and evaluation system fail to meet the requirement of new trend of scientific development and government function transformation, thus undermining the all-around enhancement of those three kinds of innovation. To step up the economic development transformation, especially the transformation of capitalizing on innovation instead of production elements to achieve economic success calls for deepened scientific mechanism reform and advance in I-U-R collaborative innovation and support in scientific alliance between enterprises, universities and scientific institutions. To solve the problem of mismatch between economy and technology and to accelerate the business-based innovation system requires strengthened I-U-R collaborative innovation. The reason why Silicon Valley in US has those high-tech businesses such as Apple, HP, Intel etc. to a large degree lies in the collaborative innovation of business, universities and scientific institutions in this area.

2.3 Policy Direction of I-U-R Collaborative Innovation

The essence of I-U-R Collaborative Innovation is to promote the organic combination of economy, technology and education. In recent years, our I-U-R Collaborative Innovation presents four new characteristics: the level of cooperation is improved constantly; the form of cooperation is innovated; the cooperation tends to have much to do with the market and the paths of the cooperation tend to be much more diverse. There are mainly six mode of I-U-R Collaborative Innovation in China at present: jointly carrying out scientific research cooperation, establishing high-tech enterprises and technology park, common set up r&d platform, jointly cultivating

innovative talents, the school cooperating with local to build industry technology innovation strategic alliance. But in terms of the present situation of the cooperation in our country, the voluntary collaborative innovation of universities, research institutes and enterprise based on the interests has not formed. If we want to achieve collaborative innovation with high standards and high starting point, we will need to make a breakthrough in the external demand driving mechanism under the regulatory guidance of the government. The practice shows that we will take an I-U-R Collaborative Innovation way with Chinese characteristics, whose essence is: it must take the enterprise as the main body and make full use of the enterprise; it must be guided by the market and make full use of the basic role of market in the allocation of innovation resources; it must take the way of I-U-R and make full use of the important role of the application and the user in technological innovation; it must adhere to the government's leading role, and innovate the system constantly. The policy direction is: the state establishes scientific and technological basis conditions platform sharing mechanism, adopts the flexible sharing model according to resources characteristics of different types of science and technology conditions, and cuts and cracks the drawbacks of intersection, mutual closure, and repeated dispersion to lay a good foundation for promoting innovation and even making strategic alliance. The state and local government promote innovation through many kinds of policy measures and collaborative approaches such as taxation, finance, evaluation.

3. The Organic Combination of Enterprise Education and I-U-R Collaborative Innovation in New Historical

3.1 Their unified target determines the feasibility of the combination of the two

The goal of enterprise education is to develop talents with basic entrepreneurial quality, creative character and enterprise ability. It is not only a kind of modern education thought, but also a kind of modern education goal. With the development of modern society, science, technology and education, it is an inevitable idea. This kind of education not only provides students strong professional skills, but also makes the students good at observation and thinking and helps them explore, create their sound personality, and cultivate their innovative consciousness and innovative ability. In essence, the basic characteristic of I-U-R Collaborative Innovation is that it is a kind of talent training mode. This understanding reveals the form of I-U-R Collaborative Innovation, which is to make innovations in the four aspects of talent training mode: education target and norms, education process, management and evaluation system, teaching methods and means. If we say the system innovation can provide a macro environment, then mode innovation is the fundamental reform of the education content. Therefore, mode innovation is the core of the I-U-R Collaborative Innovation. From the view of the innovation of the mode, the I-U-R Collaborative Innovation takes cultivating talents with innovative consciousness and practical ability as its goal, which is in accordance with the goal of enterprise education.

3.2 Resources complementarities embody the necessity of the combination of the two

The basic premise of resources dependence theory is based on the open system of an organization. This organization with open system has the following characteristics: 1. It can't work isolately; 2. It can't produce all the necessary resources internally; 3. In order to survive, it must get necessary resources from other organizations. Thus, for this organization, the lack of resources brought its needs of other organizations. The best way to solve the problems is to achieve the trade between organizations through resources complementarities based on the marginal benefit of organization. The experience of enterprise education in colleges from home and abroad and the problems that we are faced with in enterprise education at present tell us clearly that to combine I-U-R Collaborative

Innovation and enterprise education is very necessary. First, in terms of the obtaining of enterprise consciousness, there are two ways: one is the theory infusion; the other is the edification of the situation. The former can make students build up the enterprise consciousness in a short period, but this external mandatory theory infusion is difficult to be internalized into students' positive motivation. The latter is to help students obtain the necessary emotional experience and form enterprise consciousness in certain business situation. I-U-R Collaborative Innovation can provide the enterprise situation, which is beneficial to the sublimation of students' enterprise consciousness. Second, the developing of their ability and their entrepreneurial spirit has much to do with practice. I-U-R Collaborative Innovation can not only make students obtain opportunities of innovation and exploration in the production practice and research, but also enhance student's independent consciousness, sense of responsibility, risk consciousness and indomitable will. In addition, in the enterprise education process, what lacks in universities is not professor, but "coach". And there are a lot of researchers and technical experts with rich innovation experience and enterprise practice in enterprises, scientific research institutions and they can become the mentor of enterprise practice for college students, which is a precious resource to carry out the enterprise education in university.

3.3 Coordination development reflects the effectiveness of the combination of the two

Understanding of I-U-R Collaborative Innovation includes no more than two aspects: from the point of view of the production, from the point of view of the enterprise, they hope schools provide enterprises with scientific research which is of great market value; And from the point of view of "learning", from the point of view of the university, they hope enterprises provide practical teaching environment, and provide practice conditions to the students. With the development of society and the improvement of the requirements for talents, the narrow understanding of I-U-R Collaborative Innovation makes a breakthrough. Now people deal with the problem from the perspectives of the enterprise education system. System theory tell us, if different factors in a system are combined in a reasonable way, then, the system as a whole can produce more functions than originally simple addition of each factor. Of course it is the close combination of theoretical knowledge and technology development practice, but not the general sense of the production practice. In the open system of the combination of the enterprise education and I-U-R Collaborative Innovation, the student participate in the technology development practice, which can help them apply what they have learned to solve the technical problems in work site. Through the practice experience of technology development, technology promotion and technical transformation of the industry, students can really get "golden key" to the future technology innovation and their own businesses. At the same time, both schools and enterprises develop and innovate technology, improve quality, form industrial advantages and achieve the sound circulation of production and teaching, production and scientific research, promoting the transformation of scientific research achievements into real productive forces. It can also promote enterprise's second enterprise, so as to realize the win-win situation of the development of the enterprise and the school.

4. The Construction Strategy of Enterprise Education System in Higher Learning Institutions in the Context of I-U-R Collaborative Innovation

4.1 The construction of the enterprise education goal system

I-U-R Collaborative Innovation puts forward a higher demand for innovative personnel training objectives. First, the basic enterprise quality, enterprise awareness, enterprise knowledge, enterprise abilities and enterprise quality are to be taken as the common goals. Enterprise awareness includes enterprise needs, enterprise motivation, enterprise interest, enterprise outlook and so on; enterprise knowledge refers to the expertise in enterprise field, management expertise and relative knowledge

of the laws and regulations and so on; enterprise abilities include having an insight into market opportunities, rapid decision-making ability, the ability to form a team and cooperate and so on; The enterprise quality includes firm self-confidence, vigor, honesty and high sense of social responsibility. Second, open personality, creativity, sensitivity, cooperativeness and autonomy are to be taken as individual goals. Creativity refers to not sticking to conventions, having the ability to break the conventions and bold innovation ability; sensitivity refers to having a keen sensibility and insight into market environment changes based on having an access to enterprise information; cooperativeness refers to empathy, good at cooperating with others; autonomy refers to self-determination of actions and taking responsibility for their actions.

4.2 The construction of enterprise education curriculum system

I-U-R Collaborative Innovation enriches the course content and practical approaches of enterprise education in tertiary institutions. First, academic courses include General Education courses in enterprise, enterprise management courses, and scientific and technological humanities courses and so on. General Education courses in enterprise is fargoing and of a great variety, mainly including basic courses such as Enterprise, Introduction to Enterprise Education, Introduction to College Students Enterprise and so on; enterprise management courses, including a general content of the economic ideology, theory and policies, as well as expertise of production, quality, and financial management and so on; scientific and humanities courses consist of science and technology classes and the social and humanities classes offered by the school. Second, Practice courses include Enterprise Plan Competition, enterprise simulation, and practice bases construction and so on. Enterprise Plan Competition is an effective form of the implementation of enterprise education. It helps to train students' creativity, innovation and enterprise qualities; Enterprise simulation makes use of virtual enterprise education and training system or virtual enterprise corporate environment, and enables students to experience the whole enterprise operating practices; practice base construction refers to that by virtue of real-life situation of enterprises university cooperates with enterprises to build enterprise education base, and to carry out enterprise training.

4.3 The construction of enterprise education security system

I-U-R Collaborative Innovation puts forward higher security requirements for enterprise education in tertiary institutions, and also provides a favorable security conditions. First, organization security. The further development of enterprise education relies heavily on organizations of enterprise education. These organizations include the leading group of enterprise education, Enterprise Education Research Center and Students Enterprise Guidance Center. These organizations consist of Party and administrative leaders in the university and teaching professionals, planning, managing and organizing the Students Enterprise Education, carrying out academic research, forum activities and theme sessions, and guiding students' enterprise activities and enterprise education systematically. Second, faculty security. Take full advantage of the platform of collaborative innovation involving production, education and research, employ entrepreneurs, successful self-employed people, experts and scholars as lecturers and instructors through various modes such as interdisciplinary, colleges-enterprises cooperation and university-research institutions interaction, enhance the training and certification of enterprise guidance personnel. Third, services security. Through Collaboration involving production, education and research, provide intermediary services for students to enter enterprise market, and information and technical services for students' enterprise.

4.4 The construction of enterprise education environment

I-U-R Collaborative Innovation demands to promote the optimization of internal and external environment of enterprise education system. First, the social environment. The social environment

includes the policy environment, economic environment, cultural environment. In terms of policy environment, the government shall strengthen the guidance and support of students enterprise policy, gradually lift many restrictions of students enterprise relying on a variety of preferential policies, and encourage students to actively enterprise; in terms of economic environment, accelerate the establishment of the credit evaluation system, perfect risk investment mechanism, improve the construction of financial and capital market, and accelerate the improvement of institutional planning of the enterprise investment and fund construction; in terms of cultural environment, widely disseminate enterprise knowledge in the whole society, teach enterprise policies, foster enterprise examples and form good enterprise atmosphere. Second, university environment. University environment includes policy support, management system and campus culture and so on. In terms of policy support, the university shall set up a special fund, introduce management methods, and enhance the support to students enterprise; in terms of management system, build students enterprise management network, and promote the construction of enterprise education curriculum system, the practice aspect and study system; in terms of campus culture, strengthen the construction of campus culture with enterprise culture as its theme, and build public opinion environment conducive to enterprise.

4.5 The construction of enterprise education evaluation system

I-U-R Collaborative Innovation requires enterprise education evaluation to be standard and scientific. First, curriculum evaluation. Curriculum evaluation includes the academic courses and practical courses. Disciplinary curriculum evaluation can be carried out from the aspects of course structure, faculty and teaching methods and so on. Course structure shall be evaluated from compulsory courses, elective courses and interdisciplinary courses. Faculty shall be evaluated from work experiences, professional quality and research capability. Teaching methods shall be evaluated from the case teaching ratio, results transformation benefit and enterprise simulation exercise; practice course shall be evaluated from student organizations, experience platform, cooperative projects and so on. The student organizations shall be evaluated from the conditions of contacting enterprises and public institutions outside the university and organizing practice activities. The experience platform shall be evaluated from the conditions of simulation enterprise and practical teaching carried out at practice base. The cooperation projects shall be evaluated from the number of school-enterprise cooperation projects and the conditions of results transformation. Second, environmental evaluation. Environmental evaluation includes the social environment and university environment. The social environment shall be evaluated from the aspects such as support policies, financing channels, and service security and so on; the university environment shall be evaluated from the aspects such as organization structure, institutional framework and culture construction and so on.

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