

Research on the Industry-Academia-Research Cooperation Mechanism of Local University and College—Take Changchun University of Science and Technology as an Example

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Abstract

Local university and college take as their own responsibilities to serve local economy and promote social development. For them, the cooperation mechanism “Industry-Academia-Research” is not only inevitable to keep up with the development of the times and education, but also necessary to adapt themselves to market demands. It is also the way they must take to realize the revolution and development of education and teaching. In the “Industry-Academia-Research Cooperation”, local university and college need to be clear about their position: taking root among the local and serving the local in school running to fully develop their advantages and unique features. Changchun University of Science and Technology has made some achievements during these years’ practice, and also made contribution to local development in the Industry-Academia-Research Cooperation of local university and college.

Keywords: local university and college, Industry-Academia-Research Cooperation, mechanism, research

Local university and college take serving local economy and promote social development as their own responsibilities. Therefore, serving the local becomes an inherent mission of this kind of schools. Changchun University of Science and Technology (formerly known as Changchun Institute of Optics and Fine Mechanics) was once subordinate to the Chinese Academy of Sciences, National Defense Science and Technology Committee, The Fifth Ministry of Machine-Building Industry, the Mechanical Committee, Electrical and Mechanical Department and China Ordnance Industry Corporation, successively. In 1999, Changchun University of Science and Technology was put under the administration of Jilin Province, together with National Defense Technology and Industry Committee. Now it becomes a Co-built university of Jilin Province, Ministry of Industry and Information Technology, and Changchun City. It is a typical military engineering university, which is known for its photoelectric technology as well as its light, machine, electricity, calculation and material combined engineering courses. The school was founded in 1958 by the Chinese Academy of Sciences. And the famous scientist, academician of the Chinese Academy of Sciences and the Chinese Academy of Engineering, Wang Daheng is the main founder. Under long-term direct leadership of national defense industry ministries and commissions, the university has outstanding advantages in photoelectric subject and related fields, with apparent unique features in personal training and scientific research of national defense service. Because of the positive link between industry and institute, it’s the first choice to develop the cooperation mechanism Industry-Academia-Research and serve specific fields and areas. With unique subjects, the steadily rising education quality, the gradually improved scientific research ability, and the strengthened ability to serve the society, the university is identified as a provincial key university in Jilin. Its graduates are employer’s favorite, with its rate of employment always leading the country (one of the top 50 universities and colleges in China in 2011), not even to mention provincial universities. Proper self-positioning and effectiveness of the cooperation mechanism Industry-Academia-Research is the key to success of the Changchun University of Science and Technology.

1. Uniqueness, Science Oriented, and Education Based: The Premise of Sustainable Development of the Cooperation Mechanism Industry-Academia-Research of Local University and College

Under the influence and restriction of geographic location, school brand, educational appropriations and other factors, the comprehensive strength of local university or college is not so competitive as many major universities, and this gap, on the other hand, is also showing a trend of expansion. Students of local university and college are largely local, which is quite different from the student source of major universities and colleges. So if local university and college do not want to be eliminated from the list for highly competitive and powerful universities and colleges, they should be clear about the conjunction point between local universities and social demands, and make full use of it; they should also develop their potential and characteristics, thoroughly analyze and grasp the characteristics of undergraduate talent training in local university and college, in order to better serve the local society. However, development in these aspects builds on proper self-positioning. In Industry-Academia-Research, proper self-positioning is the basis of the sustainable development of local universities and colleges. Especially, only by taking root locally, serving the local, centering on local development and expanding the service scope can local university and college guarantee the long-term development of Industry-Academia-Research Cooperation.

1.1 "Taking Root Locally to Serve the Local and Strengthening Unique Features" is the Clear Self-positioning of Changchun University of Science and Technology in the Industry-Academia-Research Cooperation.

"Taking root locally to serve the local and strengthening unique features" is the basic way of local university and college to obtain achievements from the Industry-Academia-Research Cooperation. Initially established to meet urgent national needs for photoelectric professional talents, and originated from the promotion of the ordnance industry, Changchun University of Science and Technology is the only university mainly engaged in photoelectric talents cultivation and has formed distinct photoelectric characteristics and advantages during long-term practices. It is recognized as "Chinese Optical Talent Cradle". The school is also one of universities and colleges with the most complete major setting in photoelectric fields, including undergraduate majors, disciplines authorized to confer master/doctor degree, and post-doctor authorized research stations. The school fully carries forward the characteristics and advantages of the combination of mechanical and electrical subjects and makes an important contribution to the development of optoelectronic industry in Jilin province. With the demand of national defense construction, the school provides high quality military talents, and it also actively develops frontier science and technology researches according to the needs of local industry. Paying close attention to the needs of the regional economy and industry is the key of integrating the school with the local and making effective cooperation.

Idea is the forerunner of practice. After the positioning of the Industry-Academia-Research Cooperation, the school identified a Three-Combination principle. Of the principle, the three Combinations are respectively the ones that development of the university shall be combined with actual needs of regional and industrial development, with developing trend of higher education and technology, and with the university's historical traditions and school-running features. Moreover, the university greatly enhanced its scientific research level, by sticking to the three-combination teaching mode "the combination of teaching and engineering practice, the combination of teaching and scientific research, and the combination of teaching and enterprise service". The university has improved the overall school-running level finally, with focuses on serving the northeast industrial base and military engineering industry in Jilin Province, and serving the local economy.

1.2 Basing on Education to Seize the Opportunity and Innovative Training is the Clear Position of Changchun University of Science and Technology in Industry-Academia-Research Cooperation.

The fundamental task of the university is to run the school, and cultivate the talents. In the Industry-Academia-Research Cooperation, the university seeks supports and development through service, and plays roles as a leader and promoter. For local schools, on one hand, they base themselves on teaching; on the other hand, they seize the opportunity, strengthen the scientific researches, and carry out scientific innovations to maintain and guarantee its leading status in scientific and engineering filed in Industry-Academia-Research Cooperation.

First of all, the school relies on industrial background, seizes opportunities, and seeks to cultivate innovative talents. Then it forms striking characteristics of talent training in Industry-Academia-Research Cooperation. It trains a large number of high quality and applied talents with creative spirits and practical ability for the development of local economic and modernization of national defense.

As a local university that has the professional background, Changchun University of Science and Technology always adheres to the active exploration and innovative talents training mode. It includes engineering practices

of the ministry of education center, excellent engineer training program, and declaration and construction project of the college students' innovative entrepreneurial training plans. The school seizes the opportunity and further strengthens its close cooperation with Changchun Optics-Mechanics, Jilin Dongguang Group Co., Ltd., Dalian Optical Instrument Factory, Changchun National Optoelectronic Industry Base, Sino-German Laser College and China Association of Laser Weapon 209, the enterprises, institutions and industrial institutes. The school is approved by the ministry of education for excellent engineer training program, and it has declared successfully four national engineering practice education centers. Since the school sticks to clear and managerial training thought, seizes the opportunity, fights voluntarily, and combines the talent training and enterprise closely, it has trained a large number of high quality engineering and technical personnel who have the innovative ability and can meet the needs of the region and the development of the industry.

Second, the school emphasizes the practices both at school and outside school, and it creates the practice base, aiming to further strengthen students' practical ability and to improve the educational effects of Industry-Academia-Research Cooperation.

Taking photo electricity information engineering major as an example, this major not only combines Changchun Optics-Mechanics, Jilin Dongguang Group Co., Ltd., Dalian Optical Instrument Factory, and any other Industry-Academia-Research Cooperation education bases, but also establishes practice base of optical manufacturing technology at school. So the students can carry out optical-related practice at any time. During the practice in the base, the students can acquire more intuitive feeling and understanding to specific equipment, and they can also better understand the combination of theory with practice and improve their project practical ability and innovative ability. It enhances the practical ability of students in research institute and enterprise. The student's employment rate is outstanding. Recently, the one-time employment rate of photoelectric information engineering professional is about 92%, and the graduate-study admission rate is about 20%. The graduate students are mainly engaged in design and manufacturing of photoelectric instrument and precision instrument, manufacturing, coating and score of optical parts, production, and management in most relevant enterprises; there are still some students engaged in teaching and research in universities, scientific research units, and armies. Every year, the rate of students accepted by the world top 500 enterprises is above 50%, and the employment situation is encouraging.

2. Collaborative Innovation: to Continuously Enhance the Capacity of Changchun University of Science and Technology in Scientific Research and Social Service and to Lay the Foundation for the Industry-Academia-Research Cooperation

On the centennial anniversary of Tsinghua University, General Secretary pointed out that we should encourage innovation and the universities should cooperate further with scientific research institutions and enterprises, to establish strategic alliance, and to construct the new approach for talents training with scientific research institutions and industry enterprise. This certainly shows a way for Industry-Academia-Research Cooperation and promotion of collaborative innovation.

While the school is taking efforts to upgrade the original innovation, integrated innovation and introduction, digestion, absorption and re-innovation ability, it fully carries forward its subject characteristics and research advantages. It actively carries out the close cooperation with scientific research institutions, enterprises and local government, and tries its best to contribute to building an innovative and HR resource powerful country.

The school makes innovation in the region through collaboration to integrate into the construction of local innovation system. It aims at founding the highly strategic ground of the high-tech development in Jilin Province, and actively takes part in the construction of regional technological innovation system. In 2011, the school had joined five industry-academia-research alliances, including Jilin Province Automobile Technology Innovation Strategic Alliance, Industrial Technology Innovation Alliance of Universities and Colleges in Jilin Province, and Changchun laser and optoelectronic medical and research technology innovation strategic alliance, etc. Through mutual complementation and collaborative innovation of the members, it realized key technological breakthrough, accelerated the technical application and industrialization, and promoted the formation and rapid development of the dominant industrial chain in Jilin Province. The university signed a research cooperation agreement with Datang Xiangyang Wind Power Generation Co., Ltd. In accordance with the agreement, the both parties collaborated with each other in wind power generation equipment, generator sets information management and transmission, and wind field monitoring; both parties shared the major science and technology "wind turbine jack-climbing platform" project of Jilin Province.

The school makes innovation in the industry to serve national defense modernization. Based upon years of experiences in serving national defense, the school actively promotes to set up the research strategic alliance

with industry, enterprises, and research institutes. The school is planning to co-found a weapon and equipment testing techniques and test equipment research center with China Baicheng Ordnance Test Center, and carrying forward its resources and infrastructure advantages of the Ordnance Test Center, as well as its technical advantages accumulated in the long-term involvement in weapons and equipment test items. By gathering both parties' research sources from different subjects and fields to make collaborative innovation, the center will organize weapons and equipment testing, conduct strategic researches and systematic demonstration of advanced testing technologies, and develop major technology projects. The establishment of the center will create a very important research, design and application platform that covers multiple subjects and multiple teams, to further enhance national testing technology level of weapons and innovative capacity and to promote the development of armament technology.

The school makes innovation across the world to build an international collaborative platform. The school pays great attention to internationally scientific and technical cooperation, and actively cooperates with internationally renowned academic institutions to build science and technology platform. Sino-German laser processing technology training center was established in 2008 jointly by the school and the Laser Zentrum Hannover. And now it has become the Ministry of Science and Technology international cooperation base. In 2010, the school and State University of New York at Buffalo co-founded the International Nanophotonics and Biophotonics Joint Research Centre to carry out international cooperation in personnel training and scientific researches. The school makes further efforts to construct these two research centers, and proposes the idea of constructing the International Nanophotonics and Biophotonics Joint Research Centre into a provincial key laboratory in order to better carry forward the role of international collaborative innovation platform.

3. Suggestions to the Industry-Academia-Research Cooperation of Local University

Industry-Academia-Research Cooperation is in accord with current needs of social development, and it is the direction that the higher education reform chooses. How could local university and college get an advantageous position and make great achievements during the reform? This is closely related to the process of the Industry-Academia-Research Cooperation of universities, research institutions, industry departments and local governments.

First of all, they must give a full play to the advantages of local university and college. As the major battlefields of talents training and technological development, universities and colleges should make an overall analysis of local and regional economic characteristics, strengthen their own characteristics, develop their own intellectual advantages, and take initiative actions. At the same time, they should focus on the center role of enterprise, which is the execute carrier to put the scientific research into practical productive forces. More importantly, they must fully carry forward the government's macroscopically adjusting control. Government's macro-control is the external guarantee for sustainable and stable development of the Industry-Academia-Research Cooperation. When there is conflict of interests among the three parties of the Industry-Academia-Research Cooperation, and no resolution may be reached, the government will step out and make the Industry-Academia-Research Cooperation a government behavior in some ways, and meanwhile establish practical policy laws and regulations. Through the combination of legislation and economic adjustment, government could guide the effective development of the Industry-Academia-Research Cooperation with the actual interest.

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