

# Master's Education of Transportation Engineering Under the Deep Integration of Enterprise, University and Research Institutes

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**Abstract-**As far as the current educational environment is concerned, the deep integration of enterprise, university and research institutes can improve the core competitiveness of applied talents and the overall level of teachers. On the basis of establishing the deep integration system of enterprise, university and research institutes, it can achieve the goal of win-win cooperation. This paper mainly analyses the problems existing in the training of transportation postgraduates in China, and puts forward some suggestions on the establishment of a research center for deep integration of enterprise, university and research institutes and related education and training mechanism.

**Keywords-**deep integration, teaching system, training mechanism

## I. INTRODUCTION

Overseas research on enterprise-University-Research cooperative education started earlier. For example, the United States is the pioneer of Enterprise-University-Research education in this respect. It is famous for its "work-study alternation", "science park", "government-guided training mode" and so on, and has trained many excellent professionals. Then there is the cooperative education of enterprise, university and research institutes in Canada, which mainly combines the economic development and education situation to create a "Waterloo" type of cooperative education model. Japan also has a lot of research on this aspect, forming a government-led "production officer" education model. Britain's "sandwich" cooperative education model is also recognized by the world's education community. China's research on the mode of Enterprise-University-Research is relatively late. Only by drawing on the advanced educational experience of developed countries such as Europe and the United States, can we form an educational mode that conforms to our national conditions, such as "Engineering Education Research Center", "Enterprise-University-Research Joint Development Project", "All-China Research Cooperation Education Experimental Base" and so on, which are typical modes of our country's Enterprise-University-Research cooperation education.

Similarly, the research on the joint production, teaching and research training of professional master is still ahead of domestic research abroad, and has formed a certain scale.

The United States mainly adopts diversified training methods, with practice as the key link. Japan has also achieved a lot in this regard, establishing an education base for students, which integrates education, teaching, practice and expert guidance - Tsukuba Science City. Our country is still in an exploratory period, which mainly includes the joint establishment of talent training bases between schools and enterprises, the joint training of enterprise mentors, the joint training relying on project cooperation, the "spiral" training mode, and the joint training model of enterprise, university and research depending on superiority specialty.

## II. SIGNIFICANCE OF EXPLORING MASTER'S EDUCATION IN TRANSPORTATION ENGINEERING UNDER THE DEEP INTEGRATION OF ENTERPRISE, UNIVERSITY AND RESEARCH INSTITUTES

### A. Deep Integration of Enterprise, University and Research Institutes Can Improve the Core Competitiveness of Applied Talents

At present, the training of postgraduates majoring in transportation in China has a relatively perfect management system and a systematic and perfect subject system. Taking East China Jiaotong University as an example, the curriculum is structurally divided into six parts: basic subject, public basic course, frontier subject, required link, public elective course and specialized elective course, which not only clarifies the professional direction, but also interrelated. PPT courseware suitable for the training of master of engineering is the main means of teaching. The interactive teaching mode between teachers and students is adopted in the classroom. Strictly formulate the rules and regulations for topic selection and related defense. Although the education system has been perfect enough, it can only meet the requirements of school teaching, but there are shortcomings in the training of professional master's application practice. The mode of deep integration of enterprise, university and research institutes mainly provides students with market experience, educational resources and research platform through deep cooperation among enterprises, universities and research institutions. Under the guidance of Enterprise-University-Research training mode, graduate students have more opportunities to participate in social projects, learn more and more advanced scientific research technology, and then they can

better innovate and create more scientific research results, and at the same time, they can improve their collaborative ability and gain a broader vision. Enhancing the core

competitiveness of talents not only improves the employment ability, but also improves the quality of talents in the whole enterprise.

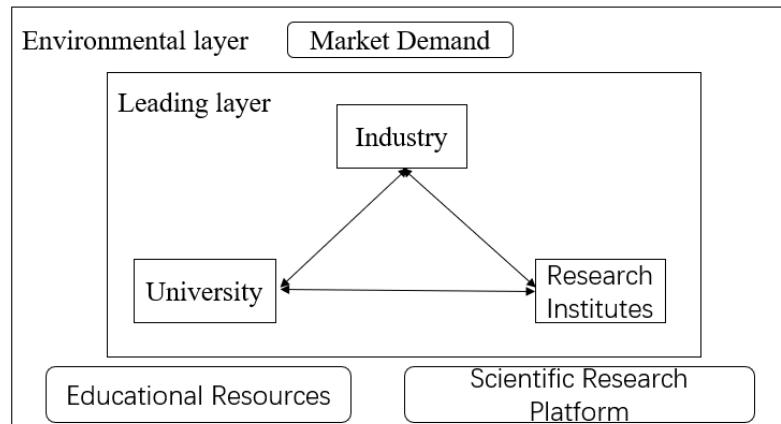


Figure 1 Collaboration model of enterprise -university-research training

#### *B. Deep Integration of Enterprise, University and Research Institutes Can Improve the Level of Teachers*

At present, many teachers in the school mainly focus on academic research and academic teaching, lack engineering practical experience, do not engage in the design, process, manufacturing and other aspects of the work within the enterprise, and lack the due feeling and understanding of some high and new technologies in the field of engineering, all of which can only stay at the level of knowing or understanding. Based on the mode of deep integration of production, teaching and research, enterprises can send staff to schools to share practical experience with teachers and students. Schools can arrange teachers to work in enterprises to study and participate in the actual work of design and production. Teachers can not only broaden their horizons and improve their professional skills, but also bring benefits and technology to enterprises. At the same time, they also get a lot of basic subject. Long-term cooperation will greatly improve the level of the entire team of teachers, but also make the whole cooperation model towards a more benign direction.

### III. ESTABLISHMENT OF TEACHING SYSTEM UNDER THE MODE OF DEEP INTEGRATION OF ENTERPRISE, UNIVERSITY AND RESEARCH INSTITUTES

Deep integration of enterprise, university and research institutes needs the support of mechanism to cultivate students 'quality and ability. Therefore, it is very important to establish the basic mechanism model of integration of enterprise, university and research institutes and to systematize and standardize the module requirements. Therefore, first of all, we should analyze the quality structure of professional postgraduate training under the deep integration, and then establish a consistent teaching system to achieve systematization and standardization.

#### *A. Quality Structure of Professional Master's Education*

Under the deep integration of production, teaching and research, the ability of graduate students is constantly improved, and the popularity of teachers is also rising. The number and types of subject will also increase. Graduate students will constantly improve their personal abilities in the subject and practice. Employment opportunities will increase. The overall strength of colleges and universities is also constantly improving, resulting in the improvement of the quality of students and a virtuous circle.

#### *B. Research on the Educational Mechanism of Deep Integration of Enterprise, University and Research Institutes*

Practice, innovation, science and theory are the key points of the deep integration of enterprise, education and research institutes, which is the key point to realize the training of postgraduates in transportation engineering. Schools provide students with high-quality theoretical knowledge, and scientific research institutions provide students with cutting-edge technology, and lay the foundation for practical work and improve student innovative ability. Enterprises provide students with funds and posts. For enterprises, enterprises have gained more efficient productivity and cutting-edge production technology; for students, students have learned professional knowledge and cutting-edge students. Production technology and practical experience improve the competitiveness of employment; for colleges and universities, to improve the comprehensive level of graduate students and teachers' team, improve the employment rate of graduate students, the future will also get better sources of students; for research institutions, the quality and quantity of scientific research personnel continue to improve, while obtaining a lot of research funds. The operation of the whole mechanism will lead to a sound development direction of win-win cooperation.

**1) Constructing the research center mechanism of the deep integration research center of enterprise, university and research institutes**

In order to establish a stable education system of Enterprise-University-Research, we should take the government as the leading factor, take part in the joint construction of universities, enterprises and research institutes, and establish a research Center-The research center of Enterprise-University-Research deep integration. Only in this way can we truly achieve the goal of deep integration of Enterprise-University-Research, which can not only eliminate the obstacles in the communication between enterprises and research institutes in universities, but also improve the whole deep integration body. The main functions of the research center are as follows.

① Communication function. Establish a platform for exchanges and cooperation among universities, enterprises and scientific research institutions, employ full-time personnel for exchanges or send commissioners from all sides to communicate and exchange, so as to achieve the goal of high efficiency.

② Evaluation function. The staff of the research center will study and establish a mechanism for evaluating graduate students 'practice, and carry out the double tutorial system in university enterprises. The practice-related assessment will be evaluated by the enterprise tutors, and the center will be responsible for statistics and accounting.

③ Allocation of functions. Enterprises and scientific research institutes send senior talents to give speeches, which are arranged and notified by the center. Graduate students in colleges and universities go to enterprises or scientific research institutions to practice and study, and are also allocated by the center.

④ Economic function. Enterprises provide financial support to universities or scientific research institutions, and establish funds to provide financial support to universities or scientific research institutions according to the requirements of enterprises.

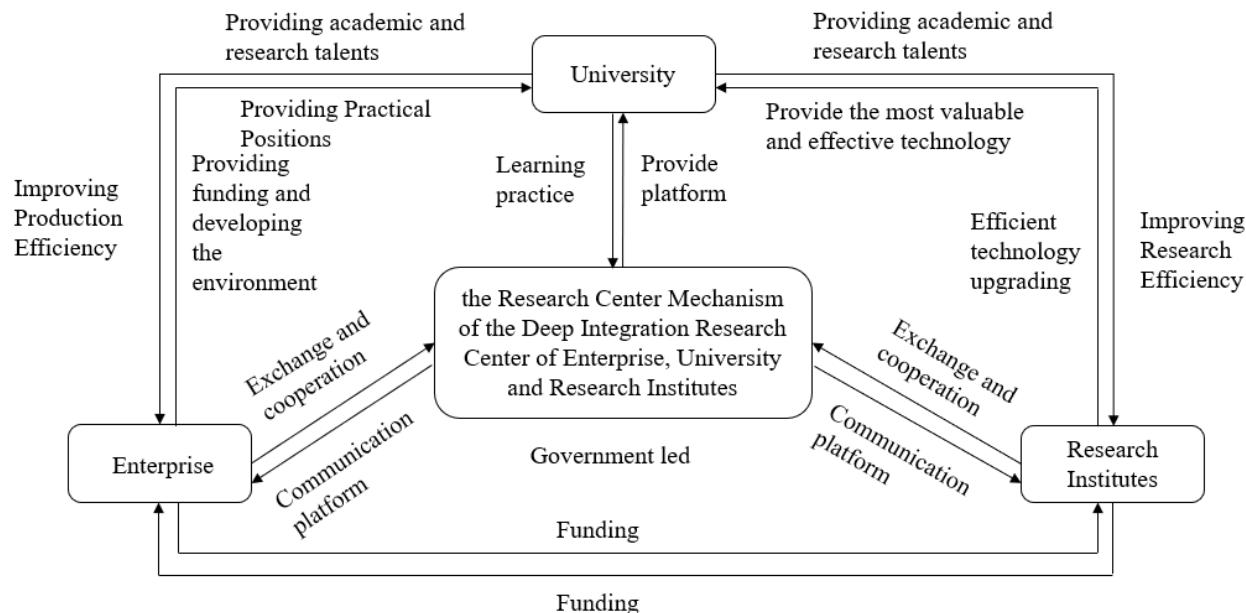


Figure 2 The teaching architecture of postgraduates majoring in transportation under the deep integration research center of enterprise, university and research institutes

**2) Establishing the training and management mechanism of the deep integration research center of enterprise, university and research institutes**

The purpose of establishing the research center of deep integration of enterprise, University and research institutes is to integrate universities, enterprises and research institutes more closely, so as to make future cooperation more efficient, harmonious and systematic. As a joint research center, it must have relevant management system, organizational structure, operation mode and management methods to achieve coordinated development within the organization. Firstly, the research center should improve

the leadership mechanism of each organization and distribute the work of each department of the center. Secondly, we should improve the management mechanism of the research center, allocate teachers, business commissioners and staff of scientific research institutes reasonably, and deal with the related problems of personnel from all sides. Finally, the whole system is optimized so that all parties in the research center can interact, integrate and collaborate to build a sustainable development platform.

*3) Constructing the resource sharing mechanism of the deep integration research center of enterprise, university and research institutes*

The research center for integration of enterprise, university and research institutes brings together university talents, enterprise funds, environment and technology of scientific research institutions, and establishes a resource sharing platform and a talent training resource sharing mechanism, which is conducive to the development and stability of research centers, and improves the efficiency of talent training, enterprise development benefits and research quality of research institutions in colleges and universities. Firstly, we should strengthen the output of university talent resources to enterprises and scientific research institutions, and establish a mechanism for sharing research center talent resources; secondly, we should strengthen the financial support mechanism of enterprises to universities and scientific research institutions, and establish a sound management fund; finally, we should establish a mechanism for sharing information technology between scientific research institutions and universities and enterprises, so as to realize the sharing of information and technology.

*4) Establishment of profit distribution mechanism for the research center of integration of enterprise, university and research institutes*

Constructing a scientific and reasonable benefit distribution mechanism is one of the keys to maintain the whole integration system. The establishment of the whole benefit distribution mechanism is conducive to promoting the enthusiasm of all parties and promoting the effective operation of the research center of deep integration of enterprise, university and research institutes. Benefit distribution mechanism should follow the principle of win-win cooperation, coordinate the conflicts of interests caused by information asymmetry, and finally affect the disorder of the whole integration system. Therefore, at the beginning of its establishment, we should consider such issues as rationality and scientificity, establish a distribution mechanism that takes good care of the interests of all parties, and realize the development vision of win-win cooperation among universities, enterprises and scientific research institutions.

#### IV. CONCLUSION

Deep integration of enterprise, university and research institutes is still the key research direction of future education reform. This paper mainly discusses some problems existing in the current graduate education of transportation engineering specialty, and puts forward some suggestions on establishing a research center of deep integration of enterprise, university and research, and perfects the whole system to realize the development vision of win-win cooperation.

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#### REFERENCES

- [1] Jiang Huimin, Chen Guohua. Research on the Cooperative Education Mechanism between Colleges and Enterprises in Northern Jiangsu Province based on Industry, University and Research [J]. Education Modernization, 2018, 5 (44): 22-24.
- [2] Xu Daqi. Research on the mechanism of deep integration of production, teaching and research to train high-quality applied talents [J]. Journal of Hebei Normal University for Nationalities, 2013, 33 (04): 116-119.
- [3] Yan Dunwang. Probe into the deep integration of industry, university and research to train high-quality applied talents [J]. Contemporary Education Science, 2012 (13): 45-47.
- [4] Zhu Aimin. Research on Practical Ability Training Model of Master of Transportation Engineering Graduate Students [J]. Modernization of Education, 2017, 4 (11): 4-6.
- [5] Du Yuchuan, Ye Xiafei, Yang Chao. Exploration and Practice of Postgraduate Training System for Transportation Engineering Degree [J]. Education and Teaching Forum, 2012 (37): 96-98.