

# Thinking of Promoting Military-Civilian Science and Technology Collaborative Innovation in Universities

ZHANG fang<sup>1, 2,</sup>

<sup>1</sup> School of Management, Northwestern Polytechnic University Xi'an Shaanxi China 710129

<sup>2</sup> School of Economics & Management, Shanxi Normal University, Lin fen, China 041000

Email: zhangfrq@mail.nwpu.edu.cn

**Keywords:** Civil-Military Integration, Colleges and universities, Collaborative innovation of military and civilian science and technology

**Abstract:** Colleges and universities are the main body of the innovation system of civil-military integration. They have a large number of innovative talents, profound innovative knowledge reserve and the world's leading innovative conditions. They are the research bases for the research and development of common technology and applied technology of civil-military integration. This study explores the promotion of military-civilian science and Technology Collaborative Innovation in universities, explores the motive force and guarantee mechanism of promoting military-civilian science and Technology Collaborative Innovation in universities, and puts forward the countermeasures of promoting military-civilian science and Technology Collaborative Innovation in universities.

## 1. Introduction

Since the Eighteenth National Congress of the CPC, the CPC Central Committee has upgraded the development of civil-military integration into a national strategy. The development of civil-military integration has shown a good momentum of overall promotion and accelerated development. China's development has entered a new normal state of economy driven by innovation instead of investment and factor. Military and civilian science and technology collaborative innovation is the organic integration of regional development strategy, civil-military integration development strategy and innovation-driven development strategy, and also an effective way to coordinate the elements of Military and civilian science and technology innovation and lead the innovation of Military and civilian science and technology. Under the new situation of vigorously promoting the strategy of integration of Military and civilian science and technology innovation, relying on the unique advantages of talents, intelligence, scientific research, equipment and other innovative resources, colleges and universities play an irreplaceable role in the construction of Military and civilian science and Technology Collaborative Innovation system.

## 2. Background

In recent years, as the frontier of talent training and technological innovation, local colleges and universities have played an important role in supporting the establishment of technological collaborative innovation system of civil-military integration, and have achieved remarkable results. However, some deep-seated problems in the technological innovation of civil-military integration are still not effectively solved. The current difficulties in promoting the innovation and development of civil-military integration in Colleges and universities are mainly manifested in the imperfect system and mechanism, the low rate of technology transformation, and the mismatch between the training of national defense personnel and the demand. Therefore, strengthening the construction of system and mechanism, speeding up the transformation of the achievements of military industry, academia and research, and strengthening the training of civil-military integration talents are the key to improve the innovation and development level of civil-military integration<sup>[1,2]</sup>. Current researches on civil-military integration focus more on the civil-military integration of the military

industry, less on the status and problems of ordinary colleges and universities in the civil-military integration. The difficulties of scientific research activities in colleges and universities in achieving civil-military integration are cultural conflict, confidential management, project management, evaluation system, market access and so on<sup>[3]</sup>. Higher education institutions have great advantages in technology innovation and personnel training, and have the unique conditions to undertake the related topics of civil-military science and technology integration innovation. Therefore, they should make full use of their own scientific research and personnel resources. At the same time, in the process of participating in the innovation of military-civilian science and technology integration, colleges and universities also need to further strengthen and improve the work of confidentiality<sup>[4,5]</sup>.

Some deep-seated problems still exist in the collaborative innovation system of military-civilian fusion technology in local colleges and universities, which is manifested by the lack of proper management system and mechanism, the barriers in technology transferring, the insufficient coordination between departments, the reuse of scientific and technological resources and the inability of talent training to meet the demand. Those all have seriously hindered the construction of cooperative innovation system of military-civilian integration in colleges and universities, and have had a significant adverse impact on promoting the development of national military-civilian integration and innovation.

In view of this, this paper explores the promotion of military and civilian science and Technology Collaborative Innovation in universities. Based on the system theory and collaborative innovation theory, this paper establishes a theoretical analysis framework of the system of Military and civilian science and technology collaborative innovation and explores the innovative elements, function orientation and power and guarantee mechanism of universities in the system, and then puts forward some suggestions for colleges and universities to promote the Military and civilian science and technology collaborative innovation.

### **3. Analytical Framework**

#### **3.1 Theoretical Basis: Systematology and Collaborative Innovation Theory**

Systematic is a new discipline which began to develop in the 1940s. It provides a scientific method and tool for people to understand the world. The system is composed of many interacting and interdependent elements, and it is a unified collection of specific functions. The system method requires that the system and subsystems, subsystems and subsystems, systems and environment should be interrelated and interacted. The system should be open, and the internal environment and external environment constantly exchange information, material and energy, interdependent and interactional. The system continuously gets input from the environment, and after the system operation, it constantly affects the environmental output.

Collaborative innovation theory comes from systems science, synergetic, innovation economics and other disciplines. Collaborative innovation in system science is a process in which the elements of the system form a unified whole on the basis of interaction. That is to say, within a certain region, there are cooperative, cooperative and synchronous behaviors among the elements in the process of interaction, and then there are synergies. Collaborative innovation is the integration effect of innovation elements under a certain operating mechanism. It is not a simple superposition of innovation elements in the system. It must be driven by a certain operating mechanism to form a benign interaction between the main subjects.

#### **3.2 Innovative Elements and Functional Orientation of Universities**

According to the synergetic theory, the synergetic innovation system of military and civilian science and technology is a complex dynamic system composed of universities, scientific research institutes, government, enterprises, service intermediaries and other main subjects, as well as their innovative resources and innovative elements. The synergetic innovation system of military and civilian science and technology includes four subsystems: knowledge innovation system, technology innovation system, Institutional innovation system and service innovation system.

Colleges and universities include ordinary colleges and military colleges and universities. Their innovative elements mainly include the following points: Firstly, universities gather innovative talents urgently needed for military and civilian scientific and technological innovation, including university teachers with profound theoretical basis, researchers with both theoretical knowledge and research ability, and young students with innovative thinking. Secondly, colleges and universities have the innovative basis for scientific and technological innovation and development to carry out major scientific research topics and interdisciplinary research, including a wide range of disciplines and multi-level, multi-cross-disciplinary specialties. Thirdly, universities have the conditions for knowledge innovation of military and civilian science and technology innovation, including the laboratory of technology innovation and the library of knowledge accumulation. Fourthly, universities can broaden the ways of transformation of military and civilian scientific research achievements, including transforming the innovative achievements of their knowledge and technology for enterprises, and assisting military and civilian enterprises in technological tackling and providing innovative talents support.

Their functions are mainly embodied as follows: Firstly, in terms of training scientific research talents, universities should cultivate innovative talents adapted to the construction of regional military-civilian scientific and technological collaborative innovation system, combining with the talent needs of military industrial groups, small and medium-sized enterprises of "civilian participation" and "civilian scientific and technological innovation enterprises, and provide personnel support for the construction of military-civilian integration innovation system. Secondly, in terms of original knowledge innovation, colleges and universities have become an important platform for original knowledge innovation of military-civilian science and Technology Collaborative Innovation system, relying on a wide range of disciplines, multi-level and cross-cutting specialties and the knowledge reserve of scientific researchers leading innovation. Thirdly, in terms of the transformation of scientific research achievements, universities should take on the important responsibility of the transformation of scientific research achievements in the military-civilian scientific and technological collaborative innovation system by broadening the channels of transformation of scientific research achievements. Finally, in the research and development of common technology for civil-military integration, universities gather innovative human resources and innovative knowledge reserves, which are the core subjects of non-profit and technology sharing technology research. Through the research and development of common technology, they promote the development of military-civil integration application technology. Research and development of basic common technology will not touch the national defense application technology restricted by confidentiality system.

### **3.3 Motivation and Guarantee Mechanisms for Colleges and Universities to Promote Civilian-Military Science and Technology Cooperative Innovation**

First, the driving mechanism of scientific and technological innovation. With the progress of society, the higher demand for innovation and development of civil science and technology and military science and technology leads to the reverse pull of Applied Technology Research on basic science, which promotes collaborative innovation and cooperation among universities, governments and enterprises.

Second, market demand traction mechanism. The potential demand of civil-military integration market forces enterprises that lack R&D innovation ability to cooperate actively with universities and scientific research institutes, as universities and scientific research institutes who have technological achievements meeting the needs of civil-military integration market do not have the transformation of technological achievements. They can transform scientific research achievements to meet the needs of civil-military integration market with the help of scientific research intermediaries, government and enterprises in terms of equipment and funds.

Third, the synergy mechanism of interest and demand. Interest demand is the motive force for the cooperation of the main bodies in the civil-military integration innovation system. Colleges and universities can gain economic benefits, enhance scientific research ability, and provide practice and

employment opportunities for personnel training in promoting the construction of Military and civilian science and technology collaborative innovation system.

#### 4. Active Measures

##### **(1) Formulating and perfecting government supporting policies for colleges and universities to participate in the construction of military and civilian science and Technology Collaborative Innovation System**

Firstly, we should improve the channels for local universities to participate in and integrate into the national defense innovation system from the national policy level, and formulate the threshold criteria and supporting policies for local universities to enter the national defense innovation system; Secondly, we should formulate the declaration process and approval criteria for encouraging local universities to participate in the construction of the military science and technology collaborative innovation system from the level of large military industrial groups; Finally, local governments incorporate military and civilian science and technology collaborative innovation system into the local science and technology policy support system, and provide policy support in platform building, team building, science and technology plan and achievement transformation.

##### **(2) Improving the Form of Training Military Talents**

In recent years, we have achieved good results in training military personnel by relying on higher education, but also encountered some problems. Under the new situation, we should adhere to the connotative development path with quality improvement as the core, highlight the traction of military demand, focus on the shortage of specialties, key universities and superior disciplines, and further improve the quality and efficiency of training military personnel relying on higher education. (1) We should expand the paradigm of training military personnel by relying on higher education. The object of training is to expand from growing cadres to all kinds of training categories including growing cadres and on-the-job cadres. The training category is from training officers to training officers, sergeants and civil servants. The training level is from undergraduate education to college, undergraduate, master and doctoral education. The training base has been expanded from ordinary universities to various units including colleges and universities, general middle schools, scientific research institutes and so on. (2) Deeply promote the reform of the training system for national defense students. Since 2017, instead of recruiting from ordinary high school graduates, examining and selecting national defense students from college students, we have adjusted to directly recruiting graduates from local colleges and universities, so as to make more extensive use of national educational resources and attract more local talents to enter the army for meritorious service. (3) Increase policy support and guidance and incentives. For units undertaking military personnel training tasks, the state has given preferential policies in terms of conditions construction, financial input, recognition and incentives.

##### **(3) Constructing a Perfect and Efficient Operation Model of Civil-Military Integration Technological Collaborative Innovation System**

We should make full use of the advantages of some colleges and universities located in the military industry base and construct efficient operation of military-civilian science and technology collaborative innovation system. Some military colleges and universities have obvious advantages in technology, talent and R&D ability, while most local universities have obvious location advantages. In order to make full use of the respective advantages of key universities and local universities, it is suggested to select some suitable military technical fields, organize key universities, local universities and military enterprises to participate in each other. In order to improve the operation efficiency of industry-university-research cooperation, a special cooperation mode of " school-school-enterprise" is set up to improve the operation efficiency of industry-university-research cooperation.

#### References

[1] Haiyan He, Lidan Jiang&Xiangmen Meng.2013."Difficulties and Countermeasures of

Promoting Innovative Development of Civil-Military Integration in Colleges and Universities ,Annual Conference of China Association of Science and Technology.”Forum on Civil-Military Integration Development of National Defense Science and Technology Industry.

- [2] Yifan Zhang, Jun Deng, Yan Li.2016.”Analysis of problems and Countermeasures of civil-military integration development in Institutions of higher learning .”Dual-use technology and products 22.
- [3] Cantao Zhong, Yueru Zong& Jun Li.2011.”Difficulties and Countermeasures of Achieving Civilian-Military Integration in Scientific Research Activities of Universities.”Science& Technology Progress and Policy 23: 144-149.
- [4] Yi Luo.2009.” The Role of Colleges and Universities in the Integration and Innovation of Military and Civil Science and Technology.” Journal of Ningbo University (Educational Science Edition) 6:61-64.
- [5] Yi Luo.2013.”Reflections on the Construction of Civil-Military Science and Technology Integration Innovation Secret System in Colleges and Universities.”Journal of Changchun University of Technology, 3: 26-27.