

Three-stage Decomposition of the Development Goal of Integrated Scientific and Technological Innovation System Based on Innovation Value Chain

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Abstract. In the context of building an integrated national strategic system and capabilities, it is of great theoretical and practical significance to study the development goal of scientific and technological innovation system. By combining the differences of different theories in the innovation system theory and the main problems of China's integrated scientific and technological innovation, this paper chooses the innovation value chain theory to analyze the main composition of China's integrated scientific and technological innovation system. Combining the comparative advantages of innovators in the existing system knowledge innovation chain, the objectives of the integrated scientific and technological innovation system are defined. The study found that China's science and technology innovation system should achieve the deep development of integration. According to the needs of different goals, the integration should be achieved from three aspects: knowledge generation, knowledge transformation and knowledge dissemination. The research puts forward suggestions on the integration of science and technology innovation system at different stages of development.

1. Introduction

In recent years, with the intensification of international competition in the field of science and technology, the integration of military and civilian science and technology innovation systems has become a key issue affecting both national defense and economic construction. In the long-term development process, the national defense science and technology innovation system and the civil science and technology innovation system have gradually evolved into a comprehensive organization of personnel, scientific research and production units, infrastructure and other social resources in response to the needs of science and technology development. The core difference between the two systems is that the law of production, transformation and dissemination of national defense science and technology knowledge is significantly different from that of civil science and technology. The development of national defense science and technology industry and national high-tech industry should be based on the common foundation and motive force. Linda Brandt believed that the transformation of national defense and the R&D of dual-use technology are military and civil science and technology innovation [1].

2. Integrated Science and Technology Innovation System Based on Innovation Value Chain

The integrated scientific and technological innovation system refers to the innovation system that integrates military and civilian scientific and technological innovation, and is a network system composed of military and civilian scientific and technological related organizations, institutions and realizing conditions [2]. The object-oriented of the integrated scientific and technological innovation system is the demand of national defense and economic development. In order to solve the complex and changing international competition problems, the analytical framework needs to be established from a dynamic perspective. At the same time, the integrated scientific and technological innovation system needs to be established based on the existing scientific and technological innovation system.

In the research on the structure and analysis of innovation system, scholars use different theoretical methods to analyze the innovation activities and their relationships of the participants in scientific and technological innovation system. We can choose the theory of innovation value chain as a tool to analyze China's integrated scientific and technological innovation system.

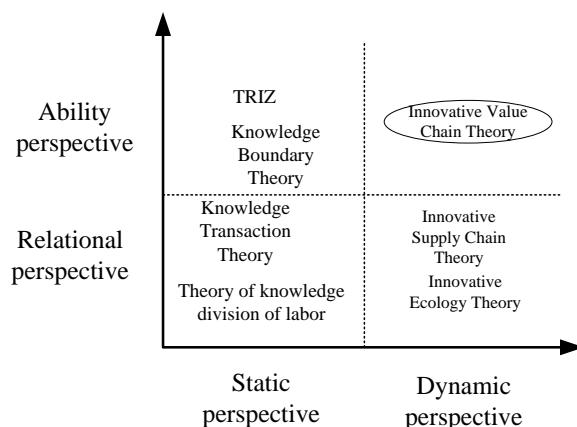


Fig. 1 Theoretical Distribution and Selection

The theory of innovative value chain is evolved from Porter's (1985) theory of value chain. Innovative value chain is the abstraction of value dimension of innovation chain. From the perspective of innovation activities, technological innovation chain reflects the whole process of scientific research achievements from topic selection to industrialization. From the perspective of resource allocation, it analyses the formation and evolution process of innovation chain, which is essentially a multi-capital. In the process of optimizing the allocation of sources, the innovation chain is generally composed of several functional nodes, among which there is a collaborative relationship. The innovation chain is formed around the core subject of the chain. Innovative value chain theory is not only applied to enterprises, but also to the whole industry and even the country. Jurowetzki R combines national innovation system with global value chain literature to conduct economic development research[3]. Ganotakis P uses innovative value chain theory to analyze the relationship between key enterprise groups, new technology enterprises and innovation performance[4]. Innovative value

chain can not only analyze the source of innovation power of enterprises, but also explain the change of innovation system.

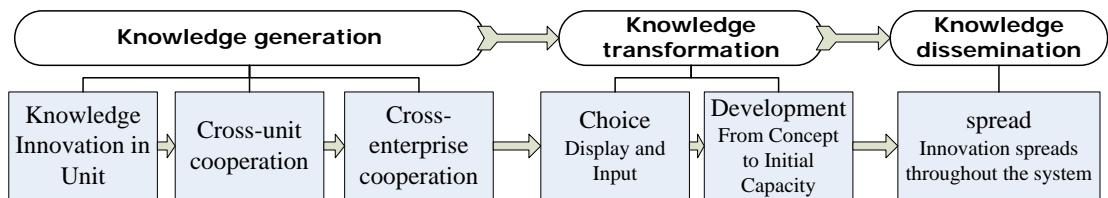


Fig. 2 Innovative Value Chain

According to Morten T. Hansen's analysis of innovation value chain, the innovation activities of innovators in the integrated scientific and technological innovation system can also be divided into three stages: knowledge generation, knowledge transformation and knowledge dissemination. There are six stages: intra-unit innovation, inter-unit cooperation, inter-enterprise cooperation, selection, development and dissemination. The existing national defense science and technology innovation system includes military enterprises, national defense research institutes, institutions of higher learning, other civil research and production units and government management institutions, etc.

In the process of operation of relatively independent national defense and civil science and technology innovation system, according to their own advantages and characteristics, various innovative subjects have gradually developed corresponding innovative value chains. In order to give full play to the innovative ability of each main body in the whole national innovation system and make scientific and technological innovation play the greatest role in both civil and national defense fields, it is necessary to build an integrated scientific and technological innovation system based on the comparative advantages of different main bodies in the innovation value chain. Therefore, the construction and maturity of the integrated scientific and technological innovation system is essentially national defense and civil science. The reconstruction of innovation value chain of research subjects.

3. The Development Goal of Integrative Scientific and Technological Innovation System

According to the comparative advantages of different innovators in different links of the innovation value chain, we can find that the construction of the integrated scientific and technological innovation system is a value chain reconstruction aiming at the complementarity of weak links and the strengthening of dominant links in the innovation value chain. Compared with the original innovation chain based on supply chain, it includes basic theoretical research, pre-research, equipment development, equipment maintenance and other links. Each innovation subject participates based on different division of labor, but the characteristics of innovation value chain within each participant are not fully reflected in the division of labor, resulting in the overall innovation ability not fully stimulated.

According to the current situation of the development of social economy and national defense science and technology in China, combined with the three main links of innovation value chain, the development goals of

China's integrated scientific and technological innovation system can be elaborated from three aspects: knowledge generation, knowledge transformation and knowledge dissemination. Firstly, China's integrated scientific and technological innovation system should realize the integration of knowledge generation, which conforms to the strong original innovation ability, high degree of system coordination and foundation. Firm requirements of basic science and technology; Second, the integration of knowledge transformation in China's integrated science and technology innovation system should achieve the goal of strong breakthrough ability, strong autonomy of the system subject and diversified terminal technology products; Third, China should realize the integration of knowledge dissemination and gradually form an integrated science and technology innovation system with multiple innovations, strong openness of the system and comprehensive technology fields.

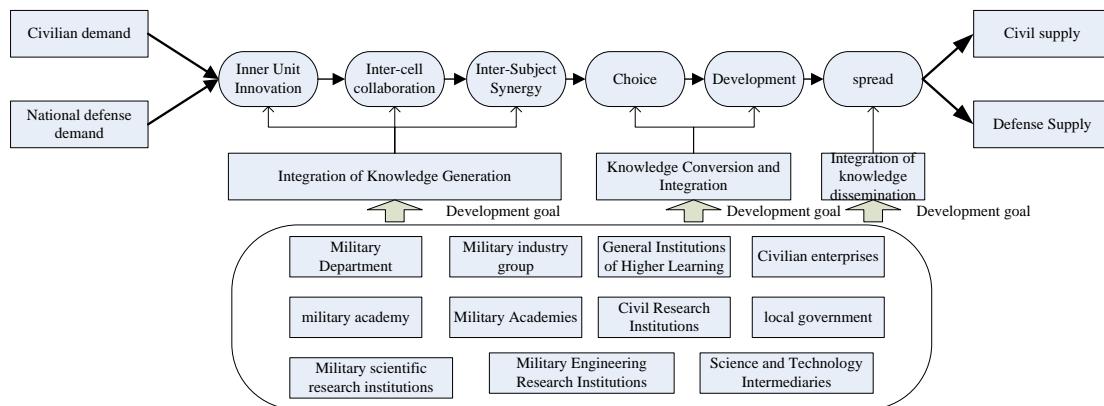


Fig. 3 Development Goals of Integrated Science and Technology Innovation System

(1) Establishing a scientific and technological innovation system with full integration of knowledge generation

The integrated scientific and technological innovation system needs to start from basic innovation and theoretical innovation to promote the overall progress of science and technology. Primitive innovation and independent innovation are the core guarantees for national innovation system to always have international competitiveness. Scientific and technological innovation in civil field provides broad potential space for national defense scientific and technological innovation. Innovation system vitality is maintained through technological diversity. Scientific and technological innovation in national defense field provides demand motive force for the generation of new knowledge. It is necessary to create an integrated scientific and technological innovation system. The new subject completes the integration of knowledge generation in the value chain. In order to realize the symbiotic development of the integrated scientific and technological innovation system, we should strive for the technological foundation, share the achievements and resources of basic research and development, strengthen the cooperation in key fields of military and civilian science and technology by coordinating the important research and development resources of the military and civilian, and provide a good soil for the symbiosis among the main bodies of integrated scientific and technological innovation.

(2) Establishing a scientific and technological innovation system with full integration of knowledge transformation

In the process of knowledge transformation, an efficient integrated scientific and technological innovation system requires that knowledge transformation activities conform to the law of innovation. In order to achieve efficient knowledge transformation in the integrated science and technology innovation system, it is necessary to realize modularization, and then to achieve organizational flexibility. The organizational flexibility of the science and technology development system enables all links in the organizational system to self-adjust and self-manage within a certain margin in order to strengthen the overall coordination. A scientific and technological innovation system capable of combating integration should be rich in technological products. The integrated scientific and technological innovation system must be able to provide enough product and technical support for the army's combat, and to enhance the combat effectiveness of the whole system with abundant supply.

(3) Establishing a scientific and technological innovation system with full integration of knowledge dissemination

The diversified development of the integrated scientific and technological innovation system, in order to achieve organizational flexibility, in the process of knowledge dissemination, can achieve the largest range of restructuring and combination of scientific and technological resources, and provide organizational basis for the rapid dissemination of scientific and technological innovation knowledge. The speed and scope of knowledge dissemination depend on the multi-domain development of the integrated scientific and technological innovation system. The division of labor in the structure of each technological link determines the time and cost needed in the process of knowledge dissemination. In the process of knowledge dissemination, different application subjects in the innovation system give full play to their respective organizational advantages so that R&D results can meet the needs of both civilian and military applications, and maximize the utilization of scientific and technological resources while improving the efficiency of knowledge application.

4. Conclusion

According to the three objectives of innovation system construction, different key measures can be delineated, appropriate laws and regulations can be formulated, innovation environment can be improved, talent system can be established, and the construction process of integrated scientific and technological innovation system can be accelerated. Under the current conditions of our country, in order to give full play to the advantages of our country's political system and promote the rapid development of integration, the construction path of the organizational restructuring integrated scientific and technological innovation system has more significant guiding significance for the construction of our integrated scientific and technological innovation system.

The construction of integrated scientific and technological innovation system is an important driving force for the deep development of integration and a systematic problem under complex conditions. It needs long-term

research and improvement. In future research, different measures and suggestions can be put forward according to different stages of system development, and specific development goals and evaluation criteria can be rationally adjusted to ensure the orderly landing of integrated national strategy.

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