

OPERATION AND MANAGEMENT ANALYSIS OF THE CIVIL-MILITARY INTEGRATION EQUIPMENT TECHNIQUE R&D

Zhao Han, Liao Yu

Military Economics Academy, Wuhan, China

Abstract: *The developing mode of the civil-military integration equipment technique R&D is an essential way for constructing and developing the PLA's equipment in the new stage. This paper presents three concrete modes for civil-military integration equipment technique. By constructing the civil-military integration equipment technique management framework with information, talents and fund as the cores, it aims to strength the cooperation of the civil-military equipment technique, use the military funds effectively and develops the national economy.*

Keywords: *civil-military integration, R&D, civil-military dual-use technique*

1. INTRODUCTION

Most of the countries in the world take the civil-military integration developing mode when advancing the development of the national economy.

According to the international security environment and national benefits, there exists military to civil, civil to military, or civil-military modes.

The CMI-NDSR investment in USA takes the military to civil mode, and carrying out Manhattan Project, Apollo Project, Star Wars Program, and Information Highway, etc, driving development of the nuke industry, aerospace, computer, GPS, and internet, etc. Japan takes the civil to military mode when driving the strategy of industrial development, aiming the future high technology and accumulating scientific and technological strength and powerful economy for national defense construction.

The Galileo project of Euro takes the civil-military global navigation service, not only driving the development of relative industry, but also improving the ability of defense and security guarantee.

There also are military-civil mode in Russia and military to civil in Israel, etc.

In the middle 1950s, Germany and Sweden started implementing the strategy of development and integration of defense technique and civilian technique. South Africa and USA implemented this strategy in 1960s and 1990s, respectively. It was implemented with the civilian technique development department as precursor and military technique development department supplying the funds, aiming to develop those industry. With the help of defense funds, a mass of civilian technique shifts to military technique in those countries. The strategy of France is to support the development of civil-military integration technique by national attention and concentrating funds, aiming to develop universal knowledge and technique.

2. THE CHARACTERISTICS OF CMI EQUIPMENT TECHNIQUE R&D

2.1 DIVERSITY OF THE INVESTMENT

SOURCE. CMI-NDSR is the integration of investment subject. In a long time, because most of the products supplied by the NDSR were public product, and the subject of the NDSR were government and military, and the fund source was national financial department, it resulted in the civil-military separation of the science research investment.

One content of the CMI-NDSR is diversity of the NDSR investment subject, including research investment on defense technique from government and military, and other economy subject in society. In the subject of NDSR investment, it is hard to separate civil and military absolutely.

One main characteristics of the CMI-NDSR is the diversity of the investment source, no longer following the national single investment subject. Because CMI-NDSR investment requires NDSR breaks self-sealing system and gradually introducing competitive mechanism, it inevitably requires opening multiple fund sources, forming stable, flexible and various NDSR investment mechanism.

2.2 DIVERSITY OF THE INVESTMENT

PURPOSE. CMI-NDSR investment is the CMI of investment purpose. In history, one technique was applied to military firstly and then was gradually applied civilian. Obtaining the leading position in defense technique indicates world leading in the science technique. So, pursuing advanced technique leads to extensive investment of NDSR. The purpose of this investment is very clear, for satisfying national defense technique requirement of the national defense construction. But from 1990s, the leading role of the national defense technique to civilian technique was changed.

In some fields, civilian technique led national defense technique, and produced large economy and social benefits, and CMI-NDSR was the result for copying this change.

The purpose of the CMI-NDSR is not only limited to traditional national defense science technique and single need of the national defense science technique, but also based on the development of the science technique and invests to those with vast application prospect, and having huge influence on civil and military field.

The purpose of the investment is to consider the final military, economy and social benefits by all aspects.

The CMI investment usually chooses high and new techniques with wide universality and application, for realizing mutual-use.

For example, in recent years, the rapid development of strategy industries show these characteristics and investment in these fields can be regards as model of CMI-NDSR.

Take the new information technique industry as example, the new generational mobile communication, the next internet, the internet of things, geographic information, high performance integrated circuit and highpoint software, etc, play important roles in driving national economy and social development, and have wide application in defense and military construction.

It is estimated that 80% of computer, military microelectronics and photoelectronics needed in developing information army is universal with civilian technique.

As the Beidou navigation system is built, the annual value of production is 50 billion, including 95% civilian customs.

Another example is space industry in developing high point equipment manufacturing industry.

It needs collective breakthrough in new material, modern manufacture, advanced power, electronic information, auto-control and computer, and has important effect on developing economy, improving livelihood and changing flight force.

2.3 THE CMI-NDSR INVESTMENT IS AN EQUILIBRIUM CONCEPT. From one aspect, the CMI-NDSR doesn't mean the investment subject including civil and military all the time. It doesn't exclude the single source of one investment subject. It means from the viewpoint of the nation or region, in the current NDSR investment, it is from government and military, and it also can be from private company. It emphasizes an idea, i.e., the NDSR is not a single action from military or civil. In the other aspect, the NDSR doesn't mean there coexists military and civil each time, not excluding some specific investment which is regarded as military or civil. It means from the view of the whole level, the investment from the nation or private company on technology has CMI universality. It emphasizes this thought, i.e., the NDSR is not only satisfying the need of civil or military, but also facing the technology having important application and universality.

3. OPERATION MODE ANALYSIS OF THE CIVIL-MILITARY INTEGRATION EQUIPMENT

National defense scientific research investment in military and civilian integration type development needs to take certain patterns, "pattern" can be understood as a way, specific to a project for the research and development, should take in what manner, namely the stakeholders should have what kind of ownership structure, the most reasonable, such as by a single way of the government or the army to public spending, or spontaneous investment of private enterprise, or a combination of both.

Due to the cause of national defense scientific research investment model that the root cause of the differences is the different characteristics of the expected results of defense equipment technology investment, therefore, the military and civilian integration, analyzing the running mode of the national defense scientific research investment is carried out according to the national defense technology equipment and general strength. Army generally contain asset specificity and equipment technology and correlation.

3.1 MILITARY TO CIVIL. With the end of the cold war and the development of global economy, national defense technology development investment presents new characteristics, besides a few countries such as the United States, Russia, most of the countries in the world military technology development costs into a trend of gradual decline, in this situation is mainly civil defense technology transformation, military equipment technology R&D mainly embedded in civilian technology R&D. People turn to the operating mode is aimed at has lower asset specificity and the low correlation with the existing national defense science, technology and industry of national defense science and technology research and development investment, this type of investment can take the military requirement "embedded" to the corresponding civil related technologies in the field of development, the investment main body of the source can be mainly depends on the related to the private sector in the field of civil, caused by private sector investment related to the development of military technology. This type of national defense scientific research investment is expected to produce technology in the field of civil already has a foundation, and the related technology in the field of civil ahead of the existing military technology, has a more extensive military application prospect, usually is not involved in defense science, technology and industry.

Operation and management analysis of the civil-military integration equipment technique R&D

By the private sector to complete this type of national defense scientific research investment, can play a military requirement to civil investment of science and technology in the field of stimulation and drawing function, also can save the government department of national defense scientific research investment, reduce the national defense construction of the "crowding out" of economic construction, to realize the harmonious development of national defense construction and economic construction.

Therefore, for the national defense equipment technology have the characteristics of low dependence, low specificity of national defense scientific research investment, can use a general research and development of embedded in the corresponding civil technology development process, to demand as the breakthrough point, demand integration, paying equal attention to capital integration and technology integration.

3.2 CIVIL TO MILITARY Conversion mode refers to the defense of the invention or technology transfer to civil economy, it includes information and data related to the defense department R&D activities such as science and technology to develop other resources.

Conversion assumes defence R&D technology is superior to the civil commercial technology, and there are a large number of idle resources, military defense resources actively to in the production and development of the civil economy.

Conversion mode for high degree of asset specificity, or high correlation between the existing national defense science, technology and industry and national defense science and technology research and development investment, the purpose of this type of investment mainly to meet the current and future a period of military requirement is given priority to, its efficiency has not been reflected in the field of civil, the main body of investment mainly relying on the public sector,

relying on the existing national defense science, technology and industry as the main body.

High degree of asset specificity, or high correlation between national defense science, technology and industry and national defense scientific research investment, usually invest in frontier technology, high degree of project risk, high investment, long cycle and the expected economic benefits short-term hard to work, private capital is often unable to undertake this task, and based on the existing national defense science, technology and industry, funded by the public sector as the main body, to ensure that project in the long-term, sustained the source of funds and improve the chances of success technology research, to ensure that a country's core military technology in certain areas of the world's advanced level.

Even some has a wider civil application prospect in the field of project, due to its high asset specificity, relying on the existing national defense science, technology and industry can easily realize "conversion", reduce the repeated construction and waste of resources, improve the efficiency of resource allocation.

Therefore, the military dependence strong national defense scientific research investment should be taken to give priority to with the existing national defense research and development department "relating to" mode, to capital as the breakthrough point, demand integration and capital integration and technology integration

3.3 CIVIL TO MILITARY The CMI mode refers to the research and development in the national economy can not only support the development of the civilian technology can support the development of military technology jointly by the technical foundation, the technology basis for defense manufacturers into the civilian economy diversify investment opportunities, and develop the business technology is widely used in military field.

Civil-military R&D cooperation mode is aimed at moderate degree of asset specificity, or medium correlation of defense science and technology research and development investment, this type of investment can take demand for military and civil common development way, the main body of investment according to their respective comparative advantages, by the public sector and private sector were completed or joint venture.

This type of national defense scientific research investment is expected to produce technology in the field of civil and military field have a certain degree of development, but because of the different emphases, the respective comparative advantage is not the same.

Jointly by public and private sectors, paid for this type of investment, can play to the advantages of private capital to pursue efficiency, also can use public capital anti-risk ability strong advantage.

Only so can produce this type of national defense scientific research investment mode, because in the process of development, science and technology used in the field of military or civilian often exist in the field of time difference, and under their demand for technological innovation also gradually change, formed have advantages of each technology.

As a result, those of medium degree of asset specificity, and the correlation technology and industry for national defense of national defense scientific research investment for "civil-military cooperation" mode, as the breakthrough point, to technology fusion technology integration, the demand and capital merge three equal attention

3. CONCLUSIONS & ACKNOWLEDGMENT

Turn from the people for R&D of defense forces, military, military and civilian R&D cooperation mode analysis is easy to see that people turn to the mode and the conversion model is the product of the cold war, it will be the national economy artificially divided into separate two departments, compared to the civilian economy, national defense economy is a kind of external economy, free from the civilian economy, in the national economy to burn a lot of limited economic resources and human resources, and shall enjoy the right of priority configuration in the allocation of resources.

Although defense economy could overflow of finished goods, but the overflow is accidental and uncertain, and military resources transformation (conversion) has high switching costs and the transformation of a certain risk.

By contrast, the R&D of defense mode of dual-use, reflects the national defense economy and a potential relationship between the civil economy, it will be two department economic organically unifies in together, become a part of the national economy blend mutually.

Civil defense economy, economic integration, in some cases, the national defense foundation to support the implementation of national strategy, and defense for civilian economy market-oriented operation, so that more efficient, more economical to complete the country's military mission.

Operation and management analysis
of the civil-military integration equipment technique R&D

REFERENCES

1. Ai FengYi, Hou GuangMing. The income distribution and the cost sharing mechanism in the vertical r&d cooperation [J]. Journal of management science in China. (2004)
2. ErikDietzenbacher. Spillovers of Innovation Effects. Journal of Policy Modeling[J]. (2000)
3. Xu HuaiFu, Gu Huanzhang. Technology innovation spillover economic analysis [J]. Journal of nanjing agricultural university. (2005).
4. Harris, M., Johnson, B.J. Name of the second example paper. *Name of the journal*. Issue (2010).