

Analysis on Current Situation of Military-civilian Coordinated Development Mechanism of Defense Science, Technology and Industry in Chengdu-Chongqing Economic Circle

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Abstract. Chengdu-Chongqing area has a strong foundation of the national defense science, technology and industry and the implementation of the regional development strategy of Chengdu-Chongqing Economic Circle has injected continuous impetus into the military-civilian coordinated development of the defense science, technology and industry in the circle. In order to promote the military-civilian coordinated development of the defense science, technology and industry, Chengdu-Chongqing Economic Circle has established a series of mechanisms to coordinate the resources and elements of the defense science and technology in Chengdu-Chongqing, realize the integration of defense science and technology, and promote the military-civilian coordinated development of the defense science and technology and industry. The practice has proved that the mechanism has remarkable effects but there are some problems which need to be carefully summarized and analyzed to further optimize the military-civilian collaborative development mechanism of the defense science, technology and industry in the economic circle.

1 Introduction

As an important gathering area of the national defense science and technology industry in China, Chengdu-Chongqing area is an economically developed area formed in the long-term development of China's economy and society, with a strong foundation of the national defense science and technology industry, and has an important strategic position in the national economic construction and national defense construction. In January 2020, the Central Government proposed the strategic deployment of the construction of Chengdu-Chongqing Economic Circle, and specifically defined the strategic positioning and strategic objectives of the construction of the economic circle, which has injected sustained impetus into the military-civilian coordinated development of the defense science, technology and industry in Chengdu-Chongqing Economic Circle.

The military-civilian coordinated development of the defense science, technology and industry in Chengdu-Chongqing Economic Circle means that under the strategic deployment of the national and local governments, the two areas follow the laws of the science and technology, integrate the resources and elements of the defense science, technology and industry of the two areas, realize the effective transfer of the defense science, technology and industry resources within or among the collaborative subjects, give full play to the complementary advantages of the collaborative subjects, and build a collaborative mechanism, and finally to realize the coordination and common progress of the national defense science and technology industry

level in the whole region and the integration of the military and civilian national defense science and technology. To this end, Chengdu-Chongqing Economic Circle has established a series of the mechanisms to coordinate the resources and elements of the national defense science and technology, to achieve Chengdu-Chongqing defense science and technology integration, the formation of regional defense science and technology divergence, and promote the coordinated development of the national defense science and technology industry military-civilian. The practice has proved that the mechanism has remarkable effects but there are some problems which need to be carefully summarized and analyzed to further optimize the military-civilian collaborative development mechanism of the defense science, technology and industry in the economic circle.

2 Achievements in mechanism construction of military-civilian coordinated development of defense science, technology and industry in Chengdu-Chongqing Economic Circle

2.1. Leading mechanism for coordinating military-civilian development of defense science, technology and industry being established

China's current military-civilian collaborative leadership mechanism for the national defense science, technology and industry was formed in the early 1980s and has

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undergone five major adjustments and reforms. In March 2008, the Ministry of Industry and Information Technology was established, and it is the only department under The State Council that has clear responsibilities for the military-civilian coordinated development of the defense science, technology and industry, responsible for the coordination of the major matters related to the defense science, technology and industry, and unified counterpart coordination of the relevant work of the State Administration of Science, Technology and Industry for National Defense. Subsequently, the Ministry of Industry and Information Technology led the establishment of a coordination mechanism composed of 23 relevant ministries of The State Council and relevant departments of the military, and the key construction tasks involved in the construction of the military-civilian collaborative weapons and the equipment research and production system were clearly divided, and the relevant military and local departments organized leadership coordination and supervision according to the task division promote implementation.^[1]

According to the division of the tasks, the local governments of Sichuan and Chongqing have respectively set up various forms of the military-civilian coordination development leading agencies, some are in charge of the provincial party committee and provincial government leaders, some are in charge of the municipal party committee and municipal government leaders, some have set up offices, some have set up coordination agencies, some are organized by the government itself, and some are jointly participated by both the military and the local government. For example, Mianyang City has established a military-civilian coordination office which led by the municipal Party committee.

2.2 Series of policy and practice guarantee mechanisms being established

At present, the scientific and technological cooperative elements of Chengdu-Chongqing urban agglomeration mainly include the universities, the research institutes, the policies and systems and the school-place alliance. Chengdu-Chongqing Economic Circle has established corresponding mechanisms in terms of policies, systems, funds, etc., and is fully prepared for the military-civilian coordinated development of national defense science, technology and industry. Chengdu-Chongqing Economic Circle is fully guaranteed in the policy, human resources and financial support mechanism related to the defense science and technology industry, which lays a solid foundation for the military-civilian coordinated development of the defense science and technology industry. In addition, the "Intellectual Property Information Service Alliance of universities in Chengdu-Chongqing Economic Circle" formed between the universities in Chengdu-Chongqing area marks the all-round and in-depth cooperation in information service work of the universities in Chengdu-Chongqing area. In terms of collaboration between the colleges and the research institutions, the dozens of the science and

technology related institutes have already existed in various cities, the counties and districts in the Chengdu-Chongqing urban agglomeration, and universities, enterprises and local governments can jointly play a strong military-civilian synergistic role in the defense science and technology industry.^[2] These guarantee mechanisms effectively promote the efficient sharing of the military-civilian collaborative resources in the defense science, technology and industry in Chengdu-Chongqing region.

2.3 Access mechanism for weapons and equipment remaining open

China's civilian military access mechanism continues to optimize, constantly improve the audit efficiency, reduce the entry threshold, and solve the problem of too wide scope of control and too high entry barriers. And these measures are conducive to accelerating the absorption of the advantageous civilian enterprises, driving the vitality of the military enterprises, revitalizing the military industry, and promoting the normalization and systematic development of the national independent innovation. At present, the participation of the civilian enterprises in the scientific research and production of the weapons and equipment in Chengdu-Chongqing Economic Circle has initially formed a scale, covering the fields of the information transmission, the computer software, the general equipment, the new materials and so on. The level of the tasks undertaken by the civil enterprises has been raised from low-end supporting to the level of key subsystems and complete machines, forming a competitive situation with the military enterprises. A pattern of the mutual support and transformation of the military and civilian technologies and capabilities has taken shape. Some civilian enterprises with unique leading technology and product advantages in the military market to occupy a place, such as the superconducting materials, the network communication systems and so on. These enterprises and institutions are the backbone of the private enterprises in the army, and have become an important part of the military industry in Chengdu-Chongqing Economic Circle.

2.4 Mechanism for transforming national defense scientific and technological achievements being continuously improved

Since the 18th National Congress of the Communist Party of China, the military industry in Chengdu-Chongqing Economic Circle has given full play to its own advantages in equipment, technology and talents, especially in the nuclear industry, the aerospace industry, the aviation industry, the shipbuilding industry, the electronics industry and other technical fields applied to the national defense construction and industrial upgrading. First of all, the traction of the major projects has accelerated the diffusion process of the advanced technologies in the military industry, and mature and applicable defense technologies have been promoted and

applied. The military enterprises have applied their technical advantages to the shipbuilding heavy industry, the instrumentation, the machinery manufacturing, the electronic appliances, etc., which has effectively promoted the economic development and technological progress in Chengdu-Chongqing region. Secondly, the military-civilian coordinated development of the industrial demonstration bases has formed a clustering effect, which has promoted the deep integration of the military industry with the civilian enterprises and research institutions in the high-end technology, the professional personnel and the scientific research facilities. For example, the upcoming Chengdu-Chongqing National new generation artificial intelligence innovation and development Pilot zone can fully attract the military research and development institutions, projects and talents, build a professional incubator and research and development platform for the military projects, and achieve the military-local coordinated development.

3 Main problems existing in mechanism construction of military-civilian coordinated development of defense science, technology and industry in Chengdu-Chongqing Economic Circle

3.1. Top-level coordination mechanism being lacking

The main management body of the military-civilian coordinated development of the defense science, technology and industry in Chengdu-Chongqing Economic Circle is the local government, and the main body carries out hierarchical management. ^[3] This coordination and management mechanism still stays at the vertical coordination level of their own governance, and the lack of an organization across Chengdu-Chongqing to carry out the top-level design and overall coordination for the military-civilian coordinated development of the defense science, technology and industry in the economic circle.

The two areas are under the jurisdiction of the different administrative units, and the military-civilian coordination lacks concrete and feasible action program guidance. So there are problems such as overlapping responsibilities, inaccurate positioning of functions, and separate governance being existed. In practice, although Chengdu-Chongqing signed a number of military-civilian cooperation agreements on the defense science, technology and industry, the effect of the industrial integration has not yet appeared. Therefore, the industrial cooperation mechanism of Chongqing and Chengdu is still to be improved.

3.2 Mechanism for coordinated military-civilian development being not operating sensitively

At present, the military-civilian coordinated development of the defense science, technology and

industry in Chengdu-Chongqing Economic Circle is still limited to the urban administrative regions at all levels and forming a pattern of dense connections at both ends and sparse coordination in the middle. Among all levels of cities in the region, the coordination between Chengdu and Chongqing occupies the main position. But the synergy between these two cities and other cities in the region is relatively inadequate. From the perspective of the collaborative investment subjects, the scope of the collaborative cooperation is mostly between the universities and research institutes, while the innovation cooperation between the national defense science and technology industry enterprises, the national defense science and technology industry and the civilian industrial enterprises is still less. The cities at all levels in Chengdu-Chongqing Economic Circle failed to completely break the barriers of the spatial location and administrative region, and failed to establish an effective cross-regional cooperation platform between the regions.

3.3 Investment mechanism of defense science, technology and industry being not attractive enough for R&D investment

The investment in science and technology research and development is the driving force for the development of the national defense science and technology industry and the investment mechanism of the national defense science and technology industry is the institutional guarantee for promoting the investment in the science and technology research and development. At present, there is still a big gap between the R&D investment of Chengdu-Chongqing Economic Circle and that of the Beijing-Tianjin-Hebei city cluster, the Yangtze River Delta city cluster and the Guangdong-Hong Kong-Macao Greater Bay Area city cluster. The lack of attraction of the defense science, technology and industry investment mechanism to the science and technology research and development has seriously affected the explosive power and endurance of the sustainable development of defense science and technology industry in Chengdu-Chongqing Economic Circle.

Firstly, the total amount of R&D investment is large but the intensity is low. In 2018, the R&D investment intensity of Sichuan and Chongqing was 1.81% and 2.01%, respectively, much lower than 6.17% in Beijing, 3.98% in Shanghai and 2.78% in Guangdong, and even lower than the national average of 2.19%. ^[4] In 2020, the total R&D internal expenditure of Chengdu-Chongqing Economic Circle reached 155.52 billion yuan, ranking first in the central and western regions. But the intensity of the scientific research expenditure is only close to the national average. As the two central cities in the economic circle, Chengdu and Chongqing rank 7th and 8th respectively among the top 15 cities in R&D expenditure in 2020 in terms of total investment, but only 10th and 15th respectively in terms of investment intensity. The data above show that the Chengdu-Chongqing Economic Circle is facing a situation where

the total amount of R&D investment is sufficient but the intensity is insufficient. [6]

Secondly, the financial services are insufficient to support the coordinated development of the military and civilian defense science, technology and industry. A sound development fund pool has not yet been formed in Chengdu-Chongqing Economic Circle. The social capital cannot better and more participate in the national defense science and technology industry project investment equity investment. And there is no corresponding guiding mechanism for the national defense science and technology industry enterprises to use multi-level capital market, and also no effective measure to support the national defense science and technology industry enterprises to carry out product financing, bond and commercial coupon financing through the science and technology credit.

3.4 Military-civilian technology coordination mechanism being not functioning smoothly

Chengdu-Chongqing Economic Circle has been vigorously developing the convergence of the technical standards in the military field and docking with the civil standards. Moreover, a catalogue of military-civilian technology transfer and promotion has been formulated to promote the integration of the military-enterprise and private-enterprise technology. [5] However, the effectiveness of the military-civilian technology integration has not been satisfactory, and the problems of the technical standards, the technical confidentiality, and the market demand restrict the effective collaboration between the two parts.

The military technology serves the national defense construction and needs to adapt to more complex and special environments, while the civilian products have different reliability and economic requirements from the military products. Therefore, the military products and civilian products have different technical standards even in the same indicators. The military standards and civilian standards are not uniform, which makes the military field shut out some high-quality private enterprises, increasing the difficulty of private enterprises to enter the military field. And the non-uniform military standards and civilian standards make the military field shut out some high-quality private enterprises, increasing the difficulty of the private enterprises to enter the military field. Therefore, the collaborative development of the product standards is the basic premise of the collaborative development of the technology.

At present, the military technology secrecy system has been relatively perfect. However, in the process of the civilian-military coordinated development, the original secrecy system cannot meet the needs of the civilian-military coordinated development, so that the military technology cannot be effectively transferred to the civilian field, and the civilian technology is also restricted by the existing secrecy system when transferring to the military field.

The development of the civil technology is market-oriented, and the development of the civil technology will lack the due traction without the demand of the market. At present, the military market is relatively independent from the civilian market, and the corresponding market for the products of the military enterprises is relatively special. In this case, there are still a series of barriers if the private enterprises want to cooperate with the military enterprises.

4 Reasons for problems in mechanism construction of military-civilian coordinated development of defense science, technology and industry in Chengdu-Chongqing Economic Circle

4.1. Weak foundation of mechanism for coordinated military-civilian development

The Chengdu-Chongqing region lacks the world's top research universities and major scientific and technological infrastructure. As the flagship universities, Sichuan University and Chongqing University are not among the top universities in the world and there is a big gap between them and the world-class universities. In 2020, there will be 15 major national science and technology infrastructures under construction or already built in Beijing, 13 in Shanghai, and only 9 in Sichuan and Chongqing. There are 21 state key laboratories in Sichuan and Chongqing, compared with 116 in Beijing and 44 in Shanghai. In 2019, there were 169 national high-tech zones in China, but only 12 were in Sichuan and Chongqing. [6] The weak resource base of the high-end science and technology R&D in Chengdu-Chongqing Economic Circle makes it difficult for the military-civilian coordination mechanism of the national defense science and technology industry in the economic circle to exert its maximum effect.

The national defense science and technology industry in Chengdu-Chongqing Economic Circle lacks core technology and leading enterprises. Taking the equipment manufacturing industry as an example, there are fewer high-end equipment manufacturing enterprises above the scale of Chengdu-Chongqing Economic Circle, and most enterprises lack core technology and independent innovation ability, and the product technology content is not high. The production and manufacturing of most enterprises show more primary processing, more parts production, fewer high-precision products, fewer brand products and fewer overall products. The key common technologies, advanced processes, core equipment, basic raw materials and parts of the high-end equipment are subject to others, resulting in the overall development of Chengdu-Chongqing high-end equipment manufacturing industry is insufficient. The lack of "Qomolangma" enterprises is one of the bottlenecks of the military-civilian coordinated development of the defense science and technology industry in Chengdu-Chongqing Economic Circle. [7]

4.2 Weak consciousness of coordinated development between military and civilian

Now the concentration of the medicine, the chemical industry, the energy and service industry with Chengdu as the core and the base of the automobile and motorcycle manufacturing and the logistics and transportation with Chongqing as the core are forming in Chengdu-Chongqing Economic Circle. However, most other cities in the region develop independently with machinery, metallurgy, electronics and other industries as the pillars, and the industrial collaboration has not yet been realized. Both Chengdu and Chongqing take the electronic information and the automobile manufacturing as pillar industries, forming a relatively complete upstream and downstream industrial chain, but still a lack of effective layout in industrial coordination. It can be seen that the national defense science and technology industry in Chengdu-Chongqing Economic Circle reflects the trend that the competition is greater than the coordination at the level of consciousness. In order to achieve greater development in the future, the defense technology industry of Chengdu-Chongqing Economic Circle needs to break the situation of the separate politics.

4.3 Differentiated management between military enterprises and civilian enterprises

The military enterprises and civilian enterprises monopolize the military products market and civilian products market respectively, forming a mutual separation, self-contained system and self-closed management system. This management system results in the development of the military technology with little regard for the prospects of the civilian market and the possibility of using civilian technology, and the development of the civilian technology is difficult to link with the military use, and there is no coordination between the technical level and the industrial base level between the military and the civilian. Although the government barriers for the civil enterprises to enter the field of the defense science and technology industry have been broken, but the supporting policies have lagged behind seriously, and the industry barriers and technical barriers still exist. The civilian enterprises are also unable to enjoy the various financial support, low interest rates, tax exemptions and preferential policies on land use enjoyed by the military enterprises. The unfair policy treatment has dampened the enthusiasm of the civilian enterprises engaged in the national defense research and production.

5 Conclusion

The coordinated development of the military and civilian is the trend of the development of the defense science, technology and industry in the world. [8] In order to promote the better development of the national defense science and technology industry, a series of mechanisms have been established in Chengdu-Chongqing Economic

Circle, which have achieved remarkable results in promoting the development of the national defense science and technology industry. However, there are still some problems in this mechanism, which needs to be further optimized to achieve greater benefits in promoting the national defense science and technology industry and regional economic development.

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References

1. Y. Long, "Research on the mode and mechanism of scientific and technological collaboration in Chengdu-Chongqing Economic Circle," *Journal of Yibin College*, p21-25, 2023(2).
2. Libaers D. (2009) Industry relationships of DoD-funded academics and institutional changes in the US university system. *The Journal of Technology Transfer*, 34(5): 474-489.
3. X. Zhang, "Thinking about the influence of industrial agglomeration on the development of Chengdu-Chongqing city cluster", *Journal of decision consulting*, p128-134, 2019(2).
4. W. Wang, "Optimizing and adjusting strategic layout of defense science, technology and industry in implementing overall strategy for regional development", *Journal of China Military to civilian*, p31, 2023(1).
5. Reppy J. (2006) Managing dual-use technology in an age of uncertainty. *The Forum*, 33(2): 257-269.
6. K. Zhang, "Striving to write new chapter in innovation and development of national defense science, technology and industry in new era", *China Military to civilian*, p55-59, 2023(1).
7. Z. Zhang, "Thoughts and suggestions on integrated development of Chengdu-Chongqing Economic Circle", *Journal of Western China*, p103, 2022(6).
8. Y. Guo, "Integrated and innovative information governance model of aviation industry under military-civilian integration strategy", *Journal of Intelligence Theory and Practice*, p33-42, 2017(10).