



China's Way for an Innovation-Driven PLA

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1. Introduction

Progress in China's reforms of its framework of science, technology and industry for national defense represents a key point in China's future aspirations to become a military power. This is also clear from the importance assigned to making our people's forces more innovative(创新型人民军队) to achieve the goal of building "the world-class military" by mid-century cited by President Xi Jinping at the 19th National Congress of the Communist Party of China held in October 2017.

This paper will explore the direction of building an innovation-driven PLA and its challenges, through a review of the background to the reorganization of the framework of science, technology and industry for national defense being carried out as part of military reforms and through a review of the relationship with military-civil fusion.

2. Background of an Innovation-Driven PLA

During his speech to the plenary meeting of the delegation of People's Liberation Army and armed policy at the 13th National People's Congress in March 2018, Xi stated, "China must strengthen national defense science and technology innovation, speed up establishment of an innovation system coordinated between the military and civilian sectors, enhance its ability for the framework of science, technology and industry for national defense to innovate itself, improve its ability to transform and manage the outcomes of cutting edge science and technology, and promote the shift to a high performance and science and technology-focused type military."¹ Indicative of such statements, the direction of PLA building is geared toward improvement of innovation capabilities related to the framework of science, technology and industry for national defense. Borrowing the words of Xi, "Science and technology represents the focal point of combat readiness for modern warfare."²

¹ "习近平十三届人大一次会议解放军和武警部队代表团全体会议," China Network Television, March 12, 2018.

² "习近平向军事科学院、国防大学、国防科技大学授军旗致训词," Xinhua Net, July 19, 2017. http://www.xinhuanet.com/politics/2017-07/19/c_1121347127.htm.

Looking at the background of these remarks, first is the current awareness that the military use of new and emerging technologies is being encouraged while ushering in new military reforms. The National Defense White Paper released in July 2019 (hereinafter, “National Defense White Paper 2019”) indicates that war is evolving in form towards informatized warfare, and intelligentized warfare is on the horizon.” This is occurring because such military reforms are characterized by the following: “driven by the new round of technological and industrial revolution, the application of cutting edge technologies such as artificial intelligence (AI), quantum information, big data, cloud computing, and the Internet of Things (IoT) is gathering pace in the military field.”³ Therefore, the PLA is moving ahead with increasing its own intelligence, in addition to the mechanization and computerization it has already undertaken before. Second, to pave the way or such military reforms, there is a need to promote the creation of cutting-edge technologies. According to Xi, “By gaining core technologies, China will finally be able to fundamentally secure national economic security, national defense security and other forms of security.”⁴ Core technology, simply put, refers to technologies that become a bottleneck to specific fields. Relying on other countries for these core technologies represents a security issue. The PLA feels a sense of urgency because core technology in the field of IT is in the hands of other developed countries, resulting in vulnerabilities in China’s national security⁵.

In addition, the changing environment surrounding weapons and equipment development may also be cited. According to data from AVIC Securities Co., Ltd., which analyzed the breakdown of China’s national defense spending, equipment spending from 2010 to 2017 increased 13.4%, exceeding the rate of increase of total national defense spending. The trend of a relative increase in the cost of equipment spending is seen⁶. With greater equipment and weapons development and innovations required to increase the intelligence of the military, the question is how to build an efficient equipment development framework. Within the PLA it has been pointed out that in order to fight an intelligence war of the future the PLA must build a more open and flat technological development framework and respond to the shift of military demand quickly⁷.

The problem is that the building of an innovation-driven PLA is difficult under the closed off framework of science, technology and industry for national defense formed only by state-owned military enterprises, which have traditionally supported the country’s national defense industry, and the PLA. To promote the military use of

³ “新时代的中国国防,” State Council Information Office, July 2019.

⁴ “习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话,” Xinhua Net, 28 May 2018. http://www.xinhuanet.com/politics/2018-05/28/c_1122901308.htm

⁵ Yatsuzuka, Masaaki. “China’s Cyber Strategy.” *NIDS China Security Report 2021*, National Institute for Defense Studies, 2020, p. 37.

⁶ “解读中国军费,” Avic Securities Financial Research Institute, June 2020, p. 10.

⁷ 吴明曦《智能化战争-AI军事畅想》, National Defense Industry Press, 2020, pp. 73-74.

new and emerging technologies with highly versatile dual use, it is impossible to ignore collaboration with the technological development capabilities in the private sector such as private enterprises and research institutes. Thus, this perspective leads to the utilization of the innovation capabilities of the private sector in China's framework of science, technology and industry for national defense.

The concept of the military-civil fusion strategy promoted as a national strategy by the Xi administration since 2015 originates from such awareness of the issues⁸. The relationship between the military and civilian sectors was discussed frequently by past administrations, but the unique aspect of the Xi administration's military-civil fusion strategy is the need to build a "civilian army" where a broader range of technological innovation from the private sector is applied to military uses flexibly and quickly, including research institutes researching the latest technologies and start-up companies, in the development of framework of science, technology and industry for national defense. In actuality, the government's control over the Chinese economy continues to increase in recent years, but a little less than 80% of research and development spending is funded by private sector money⁹. As a symbolic example, recall that Huawei spent a massive sum of around 2.4 trillion yen on research and development in 2019 alone.

While the presence of state-owned enterprises is increasing in the Chinese economy, it is becoming important to utilize the vitality of the private sector and society in order to create innovation. In this sense, China's military-civil fusion, especially the policy trends for promoting "civilian participation in the defense industries (民参军)," can perhaps be viewed as a direction of pursuing open innovation where the closed off framework of science, technology and industry for national defense opens up to the private-sector society and utilizes these resources.

3. Reforms to the Nation Defense S&T Framework in Military-Civil Fusion

Based on the above, the Xi administration is seeking to promote "civilian army" as one direction of military-civil fusion that will form the basis of building an innovation-driven PLA; in other words, it is seeking open innovation for the framework of science, technology and industry for national defense. For example, reforms in 2005 to the system of four licenses required when a private sector company enters a military industry, or the "four military industry permits (军工四证)" are positioned within this trend¹⁰. The Xi administration ushered in a major overhaul of this licensing system in

⁸ Yatsuzuka, Masaaki & Iwamoto, Hiroshi. "China's Military-Civil Fusion Strategy." *NIDS China Security Report 2021*, National Institute for Defense Studies, 2020, p. 66.

⁹ *China Statistical Yearbook 2020*, China National Bureau of Statistics. China Statistics Press, 2020, p.626.

¹⁰ Refer to Yatsuzuka & Iwamoto. "China's Military-Civil Fusion Strategy," for more detail.

2015 and 2017 to simplify it. As a result, while seeking to mitigate the burden of administrative procedures related to the acquisition of certification licensing, it attempted to encourage entry into the research and development and manufacturing of sensitive weapons and equipment, which private sector companies were not allowed to do before¹¹.

Measures positioned in the same direction can be observed even in the restructuring of organizations related to framework of science, technology and industry for national defense as part of military reforms. Two important institutions were established as organizations for leading the framework of science, technology and industry for national defense in the PLA. First, the Science and Technology Commission of the Central Military Commission established and reorganized from the General Armaments Department in 2016. According to the National Defense White Paper 2019, the main duties of the Science and Technology Commission are explained as administering the national defense science and technology strategy, leading cutting edge technological innovation in an organized manner, and promoting the development of military-civil fusion for science and technology¹². When looking at the background of reorganization from the General Armaments Department, the Science and Technology Commission appears to be promoting weapons development with a focus on the military use of cutting-edge technologies while cooperating with the Equipment Development Department of the Central Military Commission.

The Military Science Research Steering Committee of the Central Military Commission newly established in 2017 is one leadership organ. According to the National Defense White Paper 2019, the Military Science Research Steering Committee is responsible for leading research of research institutes related to the military at the Academy of Military Science, National Defense University and National University of Defense Technology, and it is positioned as the leading research institute of a broad range of military sciences. Although a detailed breakdown of the organization is not published, in response to the Science and Technology Commission's main mission of applied research related to equipment development, the Military Science Research Steering Committee may be seen as a leading organ of military research including basic research and theoretical research.

Furthermore, it is pointed out that the Military Science Research Steering Committee Commission was established using the Defense Advanced Research Projects Agency of the United States as a model¹³. On the other hand, the head of the Military-

¹¹ Kazama, Takehiko. China's Technology Acquisition Strategy -- Utilization and Related Policies on Military-Civilian Integration (2). pp. 310–311.

¹² "China's National Defense in the New Era." *State Council Information Office*. In 2021, civilian researchers are also openly recruited to the Science and Technology Commission of the Central Military Commission. "2021 中央军委科学技术委员会文职人员招聘公告." Huatu Education Group, 27 Feb. 2021. <https://ah.huatu.com/2021/0227/1957578.html>.

¹³ "Chinese military sets up hi-tech weapons research agency modelled on US body, *South China Morning Post*, Jul 25, 2017, <https://www.scmp.com/news/china/diplomacy-defence/article/2104070/chinese-military->

Civil Fusion Research Center of the Academy of Military Science, Yu Chuanxin and others, point out that, while earnestly absorbing its experiences and lessons, DARPA's structure faces the issues of (1) maladjustment of demand between military branches, (2) interference in technology transfers, and (3) lacking comprehensive system, and for this reason they do not need to mimic DARPA exactly. This suggests there is room for discussion on the extent to which they are referencing DARPA¹⁴. If assuming the viewpoint that Military Science Research Steering Committee is referencing DARPA, in addition to the research leadership over research institutes published as its mission, there is a possibility it is financing, allocating and implementing projects essential to the military use of cutting-edge sciences. However, regarding personnel, it is believed that DARPA technologists and project managers appointed through open recruitment conduct research in each field, but it is not clear whether the Military Science Research Steering Committee has the same liquidity of personnel with the private sector as DARPA¹⁵.

Regarding research institutes engaging in national defense science and technology research, the Xi administration restructured the National Defense University and National University of Defense Technology in 2017, and carried out organizational restructuring of the framework of science, technology and industry for national defense of the PLA led by the Academy of Military Science, consolidating the 77 research institutes of the PLA and armed police into 44 institutions¹⁶. During a speech by Xi on occasion of the reorganization of the Academy of Military Science in 2017, he requested that "The Academy of Military Science will create an organizational model for military science research projects by closely fusing military theory and military science and technology, responding to the new demands and new system of military science research projects" and "efforts will be made to build the world's foremost military science research institute."¹⁷

Two months later in September 2017, the Regulation on the Civilian Staff of the Chinese People's Liberation Army stipulating the status of civilian employees of the PLA was amended for the first time in 12 years. When amending this law, the status of civilian employees was clarified, their work scope expanded, hiring methods reviewed, and compensation improved. It is believed this aimed to "utilize talented human resources from society in building military units."¹⁸ Even "The Science of Military

sets-hi-tech-weapons-research-agency. Also see "中央军委军事科学研究指导委员会诞生 负责高新技术研发," Cankaoxiaoxi, 25 July 2017, www.cankaoxiaoxi.com/society/20170725/2210500.shtml.

¹⁴ 于川信·刘志伟《军民融合：DARPA创新之路》，National Defense Industry Press, 2018, pp. 345-348.

¹⁵ Kitaba, and Hayashi. "Overview of the U.S. Defense Advanced Research Projects Agency (Ver. 2)."

Center for Research and Development Strategy, Japan Science and Technology Agency, Sept. 2014. <https://www.jst.go.jp/crds/pdf/2014/FU/US20140901.pdf>.

¹⁶ "新时代的中国国防" State Council Information Office, July 2019.

¹⁷ "习近平向军事科学院、国防大学、国防科技大学授军旗致训词," Xinhua News Agency, July 19, 2017. http://www.xinhuanet.com/politics/2017-07/19/c_1121347127.htm.

¹⁸ "军委政治工作部兵员和文职人员局领导就颁布实施新的《中国人民解放军文职人员条例》答记者

Strategy 2020,” which is positioned as a textbook of the PLA, revised in 2020, cites as one measure for military-civil fusion, “improvements in the selection management system for civilian human resources,” and suggested that “the quantity and scope of advanced human resources directly recruited from society will be expanded.”¹⁹

It is worth noting that the hiring of civilian researchers by research institutes of the PLA is increasing in recent years as a result of these reforms. For example, the hiring of civilian researchers by the National Innovation Institute for Defense Technology within the Academy of Military Sciences has increased rapidly in recent years. In 2020, it recruited 50 civilian researchers, but another 100 were newly hired as well²⁰. According to estimates by Kai Lin Tay of IISS, as the following graph indicates, the hiring of civilian researchers by the Academy of Military Sciences has increased sharply over the most recent three years²¹. Of course, this rapid increase in hiring allocation of civilian researchers can be seen as indicative of the difficulty that the PLA faces in developing its own human resources into experts.

In addition, the promotion of transparency of the national defense science and technology framework of the PLA is cited as a secondary effect of this military-civil fusion strategy²². The PLA will need to publish information related to its own needs to society on a regular basis in order to widely solicit the entry of private sector enterprises and human resources into military industries. As a result, information on the PLA and its national defense industry procurement and human resources recruitment is published through the Internet. Examples include the All-Army Weapons and Equipment Procurement Information Network website (全军武器装备采购信息网) operated by the Equipment Department of the Central Military Commission as a platform for information for private-sector companies entering military industries and the Military Talent Net (军队人才网) which publishes recruiting information for civilian positions. These indicate part of such increased transparency²³.

问,” Central People’s Government of the People’s Republic of China, November 10, 2017, http://www.gov.cn/zhengce/2017-11/10/content_5238743.htm.

¹⁹ 肖天亮 主编《战略学（2020年修订）》，National Defense University Press, 2020, p. 434.

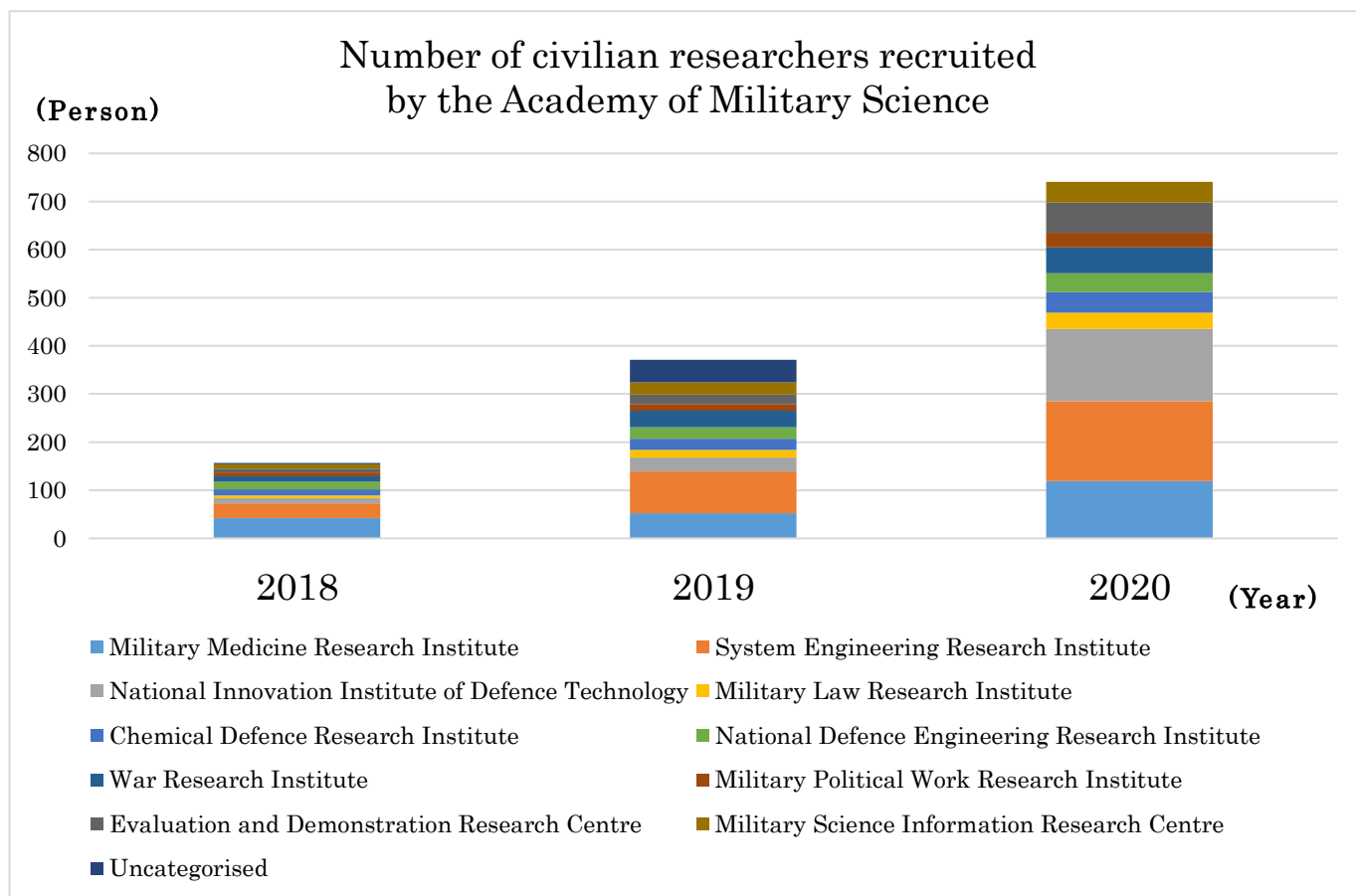
²⁰ “新增 100+！国防科技创新研究院文职招聘岗位调整！,” March 23, 2020.

<https://mp.weixin.qq.com/s/Ab6ESzvMpWp54LBNhXPbMQ>.

²¹ Kai Lin Tay, “China’s military looks to civilians to boost innovation,” IISS, 7th May 2020, <https://www.iiss.org/blogs/analysis/2020/05/china-civil-military-innovation>.

²² Marcel Angliviél, Benjamin Spevack, Devin Thorne, *Open Arms*, C4ADS 2019, pp.68-69.

²³ All-Army Weapons and Equipment Procurement Information Network website, <http://www.staroceans.org/weain/index.html>, and Military Talent Net, <http://81rc.81.cn/index.htm>.



Source: Prepared by the author based on data from Kai Lin Tay, "China's military looks to civilians to boost innovation," IISS, 7th May 2020.

4. Challenges for an Innovation-Driven PLA

Based on the above, the attempt to transform the private sector innovation capabilities into military power is underway through promotion of "civilian-involved military." However, it will be no small feat to position what was known to be a closed PLA into an open, national defense science and technology development framework.

One of the challenges, as brought up in the process of defense science and technology structural reform, is the issue of how to protect intellectual properties and information security under the legal system for private enterprises involved in the military business²⁴. On this topic, the military policy structural reform revealed in August 2020 indicated a policy structure reform proposal that includes 58 items. It indicated that systematic development of framework, including developing legislation, will be completed by 2020 under the guidance of the Leading Group for National Defence and Military Reform of the Central Military Commission²⁵. In this proposal, the Maritime Police Law, which has become a hot topic, is included, as well as the legal

²⁴ "大力加强国防科技创新," *PLA daily*, March 28, 2018.

²⁵ "国防部：军事政策制度有序推进," Ministry of National Defense, August 27, 2020.

draft that summarizes the relationship and compensation to private enterprises for equipment development and procurement²⁶.

For example, in the National Defense Law first revised in December 2020 after 11 years, while the new designation for space, electromagnetic spectrum and cyberspace as critical safety areas has attracted attention, the regulation on national defense science and technology development framework is another point worth noting. Under the law, the new policy for the defense science and technology industry to be innovation-driven and autonomously controlled (Article 34) and for the government to accelerate independent technology research and development fully utilizing the excellent resources of society (Article 35) have been newly added. On the other hand, it also clearly indicates the plan to improve the defense intellectual property system and promote conversion of defense technology outcomes (Article 35). The protection of intellectual property is a source of hesitation for private enterprises to become involved in military industries. From its description, the government's attempt to enhance the resource mobilization ability of the private sector and to minimize hurdles and concerns that private sector enterprises face when involved in military projects can be seen²⁷.

On the other hand, the fact that the Military-Civil Fusion Act (or Military-Civil Fusion Development Act) that was proposed for legislation in 2012 and still not enacted to date shows the complex interests in China and difficulty to dispel the private sector's dissatisfaction and anxiety towards the government²⁸. As with other countries, the Xi administration, too, is faced with the challenge of the growing question of how much consideration and adjustment should be given to the interests and norms of domestic actors who support the development in the realm of emerging technology²⁹. Also, another major issue is that the reorganization of China's defense technology structure will not only be a domestic problem. On his visit to the University of Science and Technology of China in April 2016, Xi emphasized that "while the government emphasizes independent innovation, this does not mean innovation should be conducted in a closed form," and as "It is impossible for any nation to solve all innovation issues by relying solely on its own abilities," he suggested conducting independent innovation through international exchange to fully leverage the innovative resources in the world³⁰. This statement suggests that even though China has risen rapidly as a technology giant, it is necessary to further develop through technological and human resource exchanges

²⁶ "中国军事政策制度改革已取得重要阶段性成果," Ministry of National Defense, March 8, 2021. http://www.mod.gov.cn/topnews/2021-03/08/content_4880589.htm.

²⁷ "新修订国防法, 新在何处," *Guangming Daily*, 3 Jan. 2021.

²⁸ Yatsuzuka & Iwamoto above, pp. 77-8, and Elsa B. Kania & Lorand Laskai, "Myths and Realities of China's Military-Civil Fusion Strategy," Center for a New American Security, January 2021, p. 11.

²⁹ Saito, Kosuke. "Innovation and Security - Why Do Civilians and the Military Integrate and What Issues Does This Bring?" Synodos, 15 Mar. 2021. <https://synodos.jp/international/24149>.

³⁰ "习近平八天内两轮自主创新与开放创新," China Network Television, 28 Apr. 2016. <http://news.cctv.com/2016/04/28/ARTIjKfC4mKXiyCT6DDGz8b3160428.shtml>.

with developed countries over the long term going forward.

However, the Xi administration's promotion of “civilian-involved military” also impacts the international environment, which can effectively be called a situation of military-civil fusion dilemma. In other aspects, the Xi administration has taken the decisive action to integrate military and civilian in order to promptly create core technology in-country, and enhance the resource mobilization power of the private sector. These private resources include Chinese tech companies and researchers who have a close relationship with overseas actors. As a result, China has caused the loss of opportunities for technological and personnel exchanges due to Western countries having raised a red flag on China's military-civil fusion development strategy as a way of promoting technology conversion and information theft from developed countries, and restricted access in developed countries for Chinese companies and Chinese researchers who are suspected of working with the PLA. In other words, China is faced with a military-civil fusion dilemma, which involves sacrificing the outside, which is required for its long term economic and technological development, if it continues to promote military-civil fusion as a measure to accelerate in-country core technology development.

It is evident that for China, where national security is particularly emphasized, international exchange on advanced technology will be hindered from such perspective, and the sacrifice of the policy of openness to the outside world, which has been the basis of the country's development, will be an undesirable long-term outcome for the country's development. The Xi administration's road to an innovation-driven PLA is not without bumps.

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