Policy Brief No. 22

September 2011

China's Defense High-Tech Leadership: Implications for S&T Innovation

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Summary

Over the last decade or more, the People's Liberation Army (PLA) has sought to establish an effective defense high-tech innovation system. The Science and Technology Committee (STC) under the General Armaments Department (GAD) has been a leading institution in this reform process, but its track record has been decidedly mixed. The STC is the most senior body in the PLA and advises on high-tech and strategic platforms. As such, the current STC has become a more professionalized agency with stronger oversight and management functions and less a think tank on cutting-edge technologies compared to its former incarnation under the former Commission for Science, Technology and Industry for National Defense (COSTIND). A key drawback of the current STC though is its inability to provide the long-term, strategic vision for future defense innovation that the PLA needs.

The Study of Innovation and Technology in China (SITC) is a project of the University of California Institute on Global Conflict and Cooperation. SITC Policy Briefs provide analysis and recommendations based on the work of project participants. This material is based upon work supported by, or in part by, the U.S. Army Research Laboratory and the U.S. Army Research Office through the Minerva Initiative under grant #W911NF-09-1-0081. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Army Research Laboratory or the U.S. Army Research Office.

THE GENERAL ARMAMENT DEPARTMENT

Following the reforms of 1998, the General Armament Department was created as the fourth General Department under the Central Military Commission (CMC). It was meant to consolidate the PLA's procurement and acquisition process formerly spread out among several bodies in the other three General Departments into one centralized institution. While the bulk of defense research and development (R&D) remained within industry groups and their subsidiaries, the PLA was able to better oversee weapons programs. These reforms also provided the PLA with greater leverage to acquire the platforms they needed to meet their military modernization goals.

The success of these reforms and the degree to which they have improved China's defense research, development, and acquisition (RDA) system has been mixed. Measuring the industry's dismal performance in the 1990s, the quality of major weapons systems produced in the last decade has certainly improved, evidenced by a range of new and advanced ships, submarines, missiles, aircraft, and space assets. However, as China moves into a new phase of developing more complex, net-centric ("informationization" in Chinese jargon) systems, its ability to innovate in more creative ways will test its still-evolving RDA infrastructure.

THE SCIENCE AND TECHNOLOGY COMMITTEE

The Science and Technology Committee under GAD is key to understanding and measuring China's progress in this evolutionary process of transforming itself into a modern fighting force (see chart on p. 21). STC enjoys a very senior and powerful position within the PLA hierarchy. It is described as the leading technical and intellectual brain trust for supporting the planning and development of defense S&T. It is the highest ranking organization in GAD–itself a powerful body, as it sits atop the entire RDA process. Moreover, it is a body that has the ear of the CMC.

The size and rank of STC's leadership is an indicator of its bureaucratic heft within GAD. At the apex is STC's six-member leadership, the most senior of which is Li Andong, a full general and of equal rank to the director of GAD. Below these six leaders are 10 permanent members, principally from the military; a number of non-permanent members; and finally at the base are 44 expert groups.

Several salient characteristics of its leadership help to elucidate both the nature and focus of STC. While several hold advanced degrees, principally in electronics (Tao Ping for example), computer science (Lu Xicheng), and aeronautics/space (Li Andong), almost all originate from within the greater procurement system that extends to the military regions and service arms. This provides them with the expertise in armament planning and procurement that is required in their positions as well as facilitating vertical connections to armament departments throughout the military apparatus. Moreover, all members of the leadership, with the exception of Lu Xicheng who has a technical rank, and the vast majority of the permanent members—where the locus of decision-making authority is—have formal military rank.

Below the STC leadership are the expert groups, a large base of expertise that consists of an estimated 1,000 technology specialists within the expert groups. These expert group members are selected in part from academia, military research centers, and the GAD system, but the majority comes from the vast workforce of 400,000 in more than 300 institutes in the defense R&D industry network.

STC'S ROLE

The primary role of the STC appears to be an advisor and lead system integrator for acquisition projects in focused high-tech fields. In other words, the STC does not comprehensively orchestrate all aspects of the defense S&T system. Rather, it is centered on a number of core competencies that are relevant to China's path toward military modernization.

First, the areas of specialization of the STC's leadership fit the pattern of governance over S&T that adheres to the doctrinal priorities established by the CMC. All of the areas are directly relevant to China's drive for greater "informationization"

and control over strategic systems. They are all key projects in which the PLA leadership has assigned a high priority. Moreover, they require a high level of coordination across S&T fields and industries. As the authoritative body for S&T decision-making, the STC leadership and members are best placed to identify and orchestrate R&D for these systems. Other areas of S&T development and more routine procurement and maintenance are overseen by other divisions in GAD or at lower-level armament departments within the services and military regions.

Second, the STC plays a central role in the early stages of weapons development. GAD's procurement and acquisition system can be broken down into roughly five stages, beginning with preliminary research and feasibility studies. While all aspects of the procurement system are crucial to understanding China's comprehensive ability to modernize its war-fighting capabilities, these preliminary stages are the most critical to the S&T and innovation phase of weapons development.

These early stages in the procurement cycle determine the PLA's armament needs, the direction, goals, key areas, scope, level, and speed of development. Proper planning at these early stages can have the greatest impact on direction of strategic modernization. The preliminary stages are also where the greatest gains in efficiency are realized because while proportionately less time and money is spent on this area of activity in the procurement cycle, it has a disproportionate affect on future weapons development and spending.

Recent reform efforts have consequently focused on these stages as critical to deeper reform in the RDA process. This is significant because the primary role of the STC is to coordinate the PLA's efforts in identifying and developing leading technologies by guiding these initial stages of procurement. Moreover, it is the bureaucratic entity where the defense industry, and to a lesser extent civilian enterprises participating in the defense sector, has its most extensive connections with the PLA, primarily with GAD personnel.

LEVERAGE OF INDUSTRY

The STC is the PLA's most powerful body leading defense S&T efforts, and while its leadership consists of a small number of professional soldiers, it depends heavily on a vast network of advisors and expert groups for specific technical support, most of which originates from the defense enterprises.

In theory, GAD and the STC retain decision-making control over most S&T defense programs and contracts while expert groups provide the technical expertise to carry out the approved S&T initiatives. This should create a balance between decision-makers and implementers in controlling and influencing the RDA process. In reality, however, once projects are determined, industry specialists, through advisory roles and expert groups, are positioned to shape programs substantially, which they are prone to do according to their constituent interests.

As a result, the system remains dominated by parochial scopes and focuses on particular technology areas. The STC remains an arbitrating body in this process, overly involved in routine operations and unable to become a body with strong executive power serving the role of long-term strategic planning and advising. This problem has become more acute as the PLA strives to operationalize increasingly sophisticated technologies into its forces and enhance combat jointness. As the complexity of weapon systems grows, so does the number of R&D institutes and production plants involved. As the number of actors in a weapon system development project grows, so do the number of moving parts, and along with that, the opportunities for rent-seeking influence in the procurement process.

In an attempt to strengthen its own knowledge base in these increasingly complex high-tech fields, the PLA is making substantial efforts to recruit into its ranks greater numbers of higher-quality experts in information and other high-end technologies to improve its overall aptitude for S&T innovation. The PLA also appears to be consolidating its R&D labs, which will give it better in-house decision-making capabilities in cutting-edge S&T areas.

INFORMAL NETWORK INFLUENCE

Interlaced throughout the defense RDA organizational structure are pervasive informal networks

and personal ties. A number of characteristics can be outlined that demonstrate a phenomenon that continues to plague the defense RDA process:

- Industry's critical role within the expert groups positions it to make decisions not only on S&T project direction, but also to make recommendations on suppliers, which is an inherent conflict of interest.
- Strict accreditation and secrecy regulations continue to erect barriers for competing, state-owned defense industries. These barriers are especially onerous for non-state enterprises, which places a high premium on informal networks. The growth in defense spending has served as an incentive to exacerbate this trend in many instances.
- Rather than follow strict competitive bidding processes, GAD often compromises by sharing contracts (compensating the loser) between different competitors, with negative effects on procuring the best technology and expertise.
- System inefficiencies have played a role in the establishment of oversight offices in the branch services to ensure that key programs meet requirements. These redundant offices complicate the streamlining of the RDA process.
- On a more positive note, while informal networks are often necessary, they are not guarantees to winning contracts. They come into play only when competing interest groups are relatively equal in terms of technology and competence. Thus, while the system has distortions, they are bounded by institutional regulations and oversight.

THE STC: KEY ORGANIZATION TO WATCH

Since being transferred to the GAD in 1998, the STC has been transformed into a far more rationalized and professionalized PLA bureaucracy, bringing management of key military R&D programs more firmly under military control. Prior to this, the STC under COSTIND was co-governed by the PLA and the State Council, but its leadership was shared (even dominated) by defense industry and academic specialists, a situation that clearly was not optimal for the military. The acquisition of greater numbers of more sophisticated, indigenously produced weapon platforms over the last decade points to the PLA's success in its bargaining position vis-à-vis industry and the S&T innovation process.

However, there are a number of trade-offs to this transformation. The rapid growth in high-tech areas and their complexity as well as the PLA's drive for integrated platforms creates a system of more 'moving parts.' This keeps the STC reliant on industry specialists who hold the overwhelming bulk of expertise. With less influence at the top, formally through the State Administration of Science, Technology, and Industry for National Defense (STASTIND), the successor to COSTIND, industry interests have been pushed downward, driving narrower industry preferences expressed by a bottom-up lobbying behavior. The growing military budget has also served to raise industry incentives to more closely couple themselves with the PLA, leading to substantial rent-seeking activities.

The impacts these distortions to the system are having on defense S&T innovation remain mixed. On the one hand, the institutional and regulatory reforms of the past decade appear to limit excessive manipulation by industry. Generally, the PLA has improved its ability to shape the RDA system to meet its growing demands in weapons systems. This is particularly true for projects that the PLA has identified as priorities, where there appears to be close and streamlined information sharing between producer and buyer.

Beyond specifically identified high-priority projects, however, the findings of this case study suggest that obstacles remain to the adoption of a more flexible, integrated procurement process. This is particularly acute for advanced and complex technologies where the PLA relies more heavily on defense industry expertise for input and must coordinate greater numbers of them. While the PLA has striven to increase its control over the RDA process, it remains reliant on expert groups and the industry specialists that populate them. These actors have an inherent incentive to control the flow of information in favor of the technology field and/or corporate interests they represent.

Since industry plays a key role in several critical early stages of the procurement process, from the generation of ideas and feasibility to preliminary research and recommendation for suppliers and producers, the system lacks a high level of parallel integration that would allow for more creative innovation. For this to happen, the bodies responsible for identifying, recommending, and overseeing the development of advanced technologies for defense application need to be more neutral and independent.

Experts in both the Chinese defense industry and GAD admit that the system continues to be flawed in many ways and argue for a unified supreme military-political administrative system. How this would differ from the former COSTIND model is a nettlesome question. Since GAD is most closely modeled after the French Directorate General for Armament, perhaps that is a place where China may look for guidance in finding a better balance in the relationship between the military and industry.

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