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Back to the Future: China's Defence Industry Innovation Paths

By Michael Raska

Synopsis

By 2030, China seeks to transform its defence industry into a leading technological innovator of major weapons platforms and systems. Will it be comparable in sophistication to global defence science and technology powers?

Commentary

China's political and military elites believe that a new wave of the global Revolution in Military Affairs is gathering pace, led principally by the United States, and China must therefore accelerate the pace of its military development. The key question, however, is whether China's defence industry can sustain its relative progress both in terms of confronting its internal constraints, while facing external competition.

China's development of its defence science and technology capabilities under President Xi Jinping has seen numerous accomplishments: from an unmanned moon landing, space docking, supercomputers, to aviation prototypes such as J-16, J-20, J-31, new helicopters, and UAVs to the ongoing construction of domestic aircraft carrier, and a record number of commissioned ships such as Type 054A, 056 frigates and 052C destroyers. In the next five to ten years, China is expected to transfer many experimental models from an R&D stage to production, including a number of systems in domains of "military rivalry" - outer space, underwater, cyber & near space.

Four waves of China's defence industry modernisation

With the widening operational requirements of the PLA, the baseline strategy for China's current defence S&T development is the "Indigenous Innovation" model – articulated in a supplementary document to the 2006 National Medium to Long-term Plan (MLP) for the Development of Science and Technology (2005-2020). The IDAR consists of introducing, digesting, assimilating, and re-innovating existing technologies (predominantly foreign arms and technology imports) in different ways, and is perceived as one of the most effective means available in closing China's technological gaps.

As in other areas of development, however, China's search for defence innovation is deeply entrenched in its historical path dependence. Indeed, China's defence industry has evolved in four

overlapping waves: the Maoist Era (1949-1976), Deng's Demilitarisation Era (1980s-1990s); Reform Era (1998-2012); and Xi Jinping's current Reform Era 2.0 (2012-present). In the early Maoist era, China's defence industrial strategy and technological development reflected dependence on Soviet assistance. At that time, China's defence sector was at the centre of the economy, controlling heavy industrial sectors, and a principal engine driving China's technological and industrial innovation development.

Under Mao, China's defence economy had two parallel technological and industrial tracks: conventional and strategic weapons development. Innovation, however, diffused primarily in the strategic sector with key programs such as *Liangdan*, *Yixing* (2 Bombs, 1 Satellite). With the Sino-Soviet split of the late 1960s, coupled with China's domestic political upheavals of the Great Leap Forward (1958-62) and the Cultural Revolution (1966-72), China's conventional base atrophied and innovation virtually disappeared.

From the late 1970s, defence science and technology programmes were regarded important in promoting economic development but not a top priority in Deng Xiaoping's *Four Modernisations*. Deng argued that China no longer faced Cold War threats, and should switch from militarisation to economic development, liberalisation, and 'opening up' reforms. Therefore, China's defence industry should pursue concurrent development of dual-use technologies applicable in both civilian and military needs - principally under the *Junmin Jiehe* strategy: combining military and civilian activities, peacetime and wartime preparations prioritise military products and let the civilian sector support the military.

One of the key programmes of that era became the National High Technology Program ("863") launched in March 1986. The programme had initially focused on developing seven strategic priority areas: laser technology, space, biotechnology, information technology, automation and manufacturing technology, energy, and advanced materials. In the mid-1990s, China expanded these areas in size, scope, and importance. The 863 Programme is ongoing, funding projects such as the Tianhe-2 supercomputer.

Convergence of civilian and military use

By late 1990s, the military output of defence industry fell to 15% (compared to 90% in 1979), and China's defence industry was nearly broken. The defence sector was plagued with excessive bureaucratic size and overstaffing, production over-capacity, scattered location of enterprises, lack of cooperation between military and civilian production, and entrenched in a conservative, risk-averse culture that resulted in inefficient production. Indeed, most Chinese systems were at least a generation or two behind comparable military equipment being produced at the time in the West or in Russia, and problems with quality and reliability abounded.

From 1998 onwards, these factors led to major reforms of defence industry, aimed to revitalise the qualitative output, processes, and management of the industry. The initial reforms under Jiang Zemin and later followed by Hu Jintao introduced market-based mechanisms, accelerated industrial consolidation, and increased R&D resource allocation. At the 3rd Plenum of the 16th Party Congress in 2003, a decision was made to build a new civilian technological and industrial base with embedded military capabilities (*Yujun Yumin*). This strategy paved the way for a convergence of civilian and military S&T hardware and processes, with associated reforms, including allowing select private sector firms to engage in defence work.

Barriers to Innovation

Notwithstanding the much improved technological capabilities, the nature of Chinese defence S&T is still based on coalition alliances, compartmentalised service structure, and overall legacy of Soviet times. This includes overlapping planning structures, widespread corruption, bureaucratic fragmentation, and most importantly, no real internal competition. Other barriers to innovation also include ensuring the structural strength, quality control, and process standardisation, evident for example in the development of engines required for the next-generation aircraft.

These barriers will continue to generate new debates with contending assessments of China's long-term defence innovation trajectories. However, understanding the strengths and weaknesses of the

Chinese defence economy, its historical paths and patterns, is important for projecting China's military modernisation future: from upgrading existing equipment, to introducing new generation of select systems that would enable the PLA to conduct "diversified missions."

Indeed, the rising importance of the debate is tied to the substantive uncertainties in potential security challenges in the Asia-Pacific region, and the perennial need to minimise miscalculations and prevent strategic surprise.

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