S. RAJARATNAM SCHOOL
OF INTERNATIONAL STUDIES
A Graduate School of Nanyang Technological University

RSIS COMMENTARIES

No. 031/2012 dated 21 February 2012

From Copier to Innovator? China's Ballistic Missile Modernisation

By Michael Raska

Synopsis

Notwithstanding the continuing veil of secrecy, Chinese ballistic strategic and tactical missile development is well into its third generation of modernisation. Its trajectory has been accelerated by reforms in China's defence industry sectors since the late 1990s.

Commentary

WHILE THE development of Chinese long-range missile and nuclear forces has been traditionally characterised as conservative, incremental, and slow, China's modernisation of its defence-industrial complex has clearly been on a steady path. This process has been enabled by the confluence of defence-sector reforms, comprehensive military modernisation, and integration of innovative operational concepts.

The net effect is expanded capabilities of China's strategic missile forces and military space platforms.

Modernisation of Ballistic Missiles

Various reports suggest that China is selectively enhancing its strategic and tactical missile capabilities by developing solid fuel motors; diversifying its range of warheads and increasing their accuracy; deploying missiles with multiple warheads; and upgrading its ballistic-missile defence countermeasures such as penetration aids (decoys, chaff, jamming and thermal shielding) and possibly Manoeuverable Reentry Vehicles - MaRVs - as well as Multiple Independently Targetable Reentry Vehicles - MIRVs.

In particular, China is developing, testing, and deploying not only a new generation of solid-propellant, road-mobile intercontinental ballistic missiles (ICBMs) such as the DF-31 and DF-31A equipped with nuclear payloads. It is also designing and developing new classes of conventionally-armed short-range ballistic missiles (SRBMs) and medium-range ballistic missiles (MRBMs) such as DF-21 variants. These are mobile; use solid-propellant rocket engines with short system reaction time; have longer range, more accurate guidance; and are able to exploit vulnerabilities in ballistic missile defence systems.

As part of its missile and nuclear force modernisation, China is also focusing on developing its sea-launched ballistic missiles (SLBMs) such as the JL-2, testing the DF21-D as an anti-ship ballistic missile (ASBM) for maritime strikes, and further developing its anti-satellite weapon capabilities (ASAT).

With the continuous and phased modernisation of China's strategic assets, Beijing aims to enhance the credibility of its minimal deterrence posture by improving the survivability of its nuclear forces. In doing so, China is diversifying its inventory of missiles in terms of strike-capabilities and mobility, and formulating innovative Anti-Access/Area Denial asymmetric warfare concepts and doctrine to close the gap with more technologically advanced adversaries and near competitors - principally the United States, Russia and Japan.

Defence-Industry Reforms

The qualitative and quantitative progress in the modernisation of China's strategic assets and capabilities should be seen in the context of the ongoing transformation of China's defence industries, particularly the aerospace sector over the past decade.

Since the late 1990s, Beijing has gradually introduced elements of competition and globalisation into China's military-industrial base with the aim to overcome the entrenched monopoly of China's traditional defence-industrial conglomerates. The reforms in the Chinese defence industrial base have been guided by two broad policy concepts: (1) "Four Mechanisms" – competition, evaluation, supervision, and encouragement and (2) "Yujun Yumin" or the concept of locating military potential in civilian capabilities, where defence industries are integrated into the broader civilian economy.

The reforms have essentially enabled China to streamline its military space system R&D as well as technology transfers between selected components of its civil and commercial space programmes. In doing so, China has also been able to bypass existing export controls and restrictions on the transfer of sensitive military technologies, particularly aerospace and satellite technologies.

Indeed, China's military use of space is increasingly dependent and interlinked with civilian and commercial space activities, human capital and expertise, space systems, assets and infrastructure. Its space launch vehicles (SLVs) can be used to launch satellites with a range of applications – communications, weather, earth-observation, navigation, which may significantly enhance the effectiveness of PLA's military space operations and systems. While ballistic missiles have generally different rocket engines, basing profiles, and launch methods, their guidance and control systems may use similar components as in the SLVs. On the other hand, SLVs may use similar stage components based on ballistic missiles.

Strategic Implications

Overall, the trajectory of China's ballistic missile R&D and production shows a gradual albeit qualitative transition from a copier and reproducer of Soviet ballistic missile technologies (first generation) in the earlier decades to adapter and modifier of smaller, mobile, solid-propellant ballistic missile systems and their follow-on systems (second generation) throughout the mid and late 1980s. China is now an independent producer and technological innovator of selected missile systems and related aerospace technologies in the 21st century.

Ultimately, China views its military, civil and commercial space programmes at the forefront of its national security and defence as well as economic development and geostrategic influence. Politically, China's strategic assets and space programmes may amplify Beijing's geopolitical influence and freedom of action. Militarily, they enable the PLA to accelerate its ongoing transformation drive. Economically, they propel the economic and technological advancement of China's space industrial base.

In short, China's aerospace capabilities – both civil and military - are thus seen as vital to China's rise, power projection and global influence.

Michael Raska is an Associate Research Fellow at the Institute of Defence and Strategic Studies, a constituent unit of the S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University. He is also a PhD Candidate at the Lee Kuan Yew School of Public Policy, National University of Singapore.