KIDA Korea Institute for Defense Analyses

ROK Angle
Korea's Defense Policy

ISSUE 229 November 26, 2020

Trend of North Korean Defense Science & Technology Policy in Kim Jong-un era and Its Changing Features

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North Korean defense science and technology has visibly developed and changed since Kim Jong-un assumed power as the Supreme Leader of North Korea in 2012. Noticeable changes include the resumption of nuclear tests in 2013 since 2009 along with the continuous development and disclosure of a variety of new guided weapons, such as the Pukguksong ("Polaris") and Hwasong missiles. This provides evidence that North Korea's defense science and technology programs exceeded the previous level and their development have accelerated. The North Korean military parade that celebrated the 75th anniversary of the Party Foundation Day in October distinctly revealed its leap. Against this backdrop, this paper attempts to analyze the trend of North Korean defense science and technology policy in Kim Jong-un era and draw strategic implications of the resultant changes.

Trend of North Korean Defense Science and Technology and Changing Features

First, it seems that North Korea was determined to develop nuclear warheads and carrier rockets between 2013 and 2017 as part of strengthening its self-defense. Afterwards, it focused on the development of related technology between 2013 and 2015. On the completion of its technology development between 2016 and 2017, in late 2017, North Korea declared completion of state nuclear force, which Chairman Kim Jong-un had declared as a primary. Starting in 2018, North Korea revealed its intention to mass-produce

nuclear warheads and carrier rockets and continuously acquire its military force for allegedly self-defense by developing advanced defense science and technology.

Second, with regard to the development of defense industry, between 2013 and 2014, North Korea pushed ahead with the initiative that underscored self-reliance (*juche*), modernization, scientification, and informatization. Since then, it pursued independence between 2015 and 2017. Presumably, North Korea had put in a great effort to achieve domestic production of major sub-systems, components, parts, and production process as it had previously relied on other countries including Russia and China. Following North Korea's completion of nuclear force in late 2017, since 2018 it had strived to raise the level of defense industry in order to attain the next goal of development of the advanced science technology. It seems that in 2019, North Korea made a commitment to developing and acquiring world-class advanced defense science and technology.

Third, as for the weapons systems, North Korea worked on precision, weight-lightening, unmanned technology in 2013. This suggests that it intended to improve accuracy and maneuverability of its weapon systems. North Korea concentrated on guided weapons, which once fired, operate on their own according to preset missions, instead of on platforms like tanks or aircrafts that are operated and controlled by humans. Between 2014 and 2015, North Korea added intellectualization to its task list. This effort is projected to be related to technological sophistication in intensively-managed areas at that time, i.e. sensors or the guidance and control of guided weapons. In 2016, North Korea pursued modernization in order to improve performance of its outdated weapon systems and develop new modern weapon systems that are in line with the global trend. Since 2017, North Korea had placed an emphasis on an ultra-precision functions. This represents North Korea's strong commitment to developing guided weapons that feature accuracy and are similar to the advanced guided weapons owned by major advanced countries including the U.S. To this end, North Korea will continue upgrading sensors or guidance and control technology.

Fourth, with reference to the development defense science and technology, it seems that North Korea accelerated its existing efforts in 2013. Accordingly, in 2014, it seemed to focus on enhancing and improving its major sub-systems and precision-related technology. Since 2015, it is believed that North Korea started full-scale development of independent technology to achieve an independent development in precision and

intellectualization. With this foundation, in 2016, it further developed key technologies. It is presumed that from 2017, the independent technology development was fully activated in North Korea and it started development of leading edge core technology. With is declaration of nuclear completion, it went into high gear in 2017, linking its developed technology to mass production. Facing sanctions from the international community, North Korea would attempt to promote the productivity through efficient use of its limited finance and resources. In this sense, North Korea seemed to work on creating a modernized production process independently as early as 2018.

Strategic Implications

The above-discussed trend and changes in North Korean defense science and technology have significant implications. First, North Korea is expected to proceed with its development of future advanced guided weapons to aggressively. Since 2017, North Korea has pushed forward with securing ultra-precision of military arms and equipment, upgrading its defense industry and developing world-class technology. It has also reinforced independent development of key advanced technologies. Seen from this, North Korea has revealed its intention to modernize its defense science and technology and to develop future advanced defense science and technology in earnest. Since its plan builds on the previously acquired technology, North Korea is expected to push forward with the development of advanced defense science and technology capabilities that are related to guided weapons. In addition, North Korea is likely to get down to the development of advanced guided weapons. That North Korea's declaration of completion of nuclear force in late 2017 was only possible because it had prioritized development of the technology related to nuclear warheads and ballistic support this judgement. It is in this context that North Korea, since 2019, has disclosed and test-fired its new tactical guided weapons. Therefore, it cannot be ruled out that North Korea will take its chance and develop advanced guided weapons, such as a hypersonic glide body in the mid- to long-term timeframe. This is a very grave challenge as it could lay an additional burden and pose an increasing threat on us. We are yet to secure a credible strategy and means to respond to North Korea's various guided weapons. Furthermore, North Korea appears to reveal its

intention to secure asymmetric advantage beyond the current strategic guided weapons, toward tactical and future advanced guided weapons in the mid- to long-term.

Second, North Korea seems to implement full-scale mass production of its new guided weapons. Lately, North Korea is strengthening the linkage between technology development and production, thus pushing forward with its independent modernization of the production process. This is a signal that North Korea will proceed with the mass production of its recently developed guided weapons in a bid to ensure the continuous acquisition and maintenance of its military force for self-defense. For example, North Korea is highly likely to work on the mass production of key strategic ballistic missiles following the completion of its nuclear force in 2017. Along with the new and recently developed guided weapons, North Korea will apply a modernized process which features a higher productivity of the mass production of its advanced guided weapons. Therefore, we cannot discount a possibility that such guided weapons will promptly join its combat force in droves. In such a case, we will face rapidly growing asymmetric threats from North Korea. This would mean a considerable increase of defense budget as we would have to acquire an additional equivalent force to respond to the various guided weapons.

Lastly, it is believed that North Korea's defense science and technology programs are evolving from technology learning to technological innovation. North Korea now asserts that based on its achievements until 2017, its defense science and technology and defense industry have elevated to the levels of self-reliance, independence, and creative development. For example, North Korea says that it has broken away from dogmatism, conservatism, and formalities as well as dependence on foreign countries' technology, which were pointed out as chronic problems. Given this, North Korea states that it has reached the stage where it independently strengthens and develops its defense science and technology not through technology learning (imitation) but through technological innovation (creativity). Such a foundation for the independent development of defense science and technology through technological innovation seems to have been established in 2017 and North Korea will further exploit this advantage. The consistent intensive development of technology for various guided weapons in North Korea since Kim Jong-un took power suggests that the development through technological innovation will be more actively made. It is supported by the fact that North Korea has, since 2019, disclosed

and test-fired these new tactical guided weapons which are not even developed by the major countries. Accordingly, while it will be limited to some aspects like guided weapons, the asymmetric advantage in technology that North Korea enjoys over South Korea may be continuously expanded and strengthened.

North Korea’s recent military parade teaches a lesson that the unproductive endings in the two US-North Korea summit talks in 2018 and 2019 left much to be desired. These inconclusive summits provided the time that North Korea needed to upgrade its technology related to nuclear warheads and guided weapons. From the standpoint of the US, it missed its chance to deter North Korea's expansion of its strategic nuclear capability. North Korea has in turn missed its chance to see the withdrawal of the sanctions against it. It has also not benefited from the inter-Korean economic cooperation, which was strongly wished for by Chairman Kim Jong-un and is indispensable for the economic development and prosperity in North Korea. Therefore, both the US and North Korea need to gradually build trust through mutual compromises and accumulate tangible achievements in the talks. For instance, both the US and North Korea need to get away from the opposition that rules out the give-and-take approach. They should work hard and together to establish a negotiation framework that can produce a virtuous cycle toward the complete denuclearization of North Korea through the provision and trade-off of small, but substantial interests.