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The Ballistic Missile Defense Construction Strategies of South Korea and Japan: Self-reliance versus Cooperation with the US

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This paper compares the South Korean Ballistic Missile Defense (BMD) to the Japanese one with a focus on the two countries' cooperation with the United States of America (US). It introduces the basic concept of BMD and challenges that the North Korean nuclear missile threat presents to the BMDs of South Korea and Japan. In addition, it examines the backgrounds and capabilities of the two countries' BMDs and outlines some differences from the examination.

The comparison between South Korea's and Japan's BMD shows that the level of Japan's BMD was higher than South Korea's. The main reason for the gap lies in the level of cooperation with the United States. Japan began its BMD by closely cooperating with the United States; however, South Korea intentionally refrained from cooperation with the United States. Thus, the South Korean BMD went through several rounds of trial and error without being advised by the United States, the world's BMD leader. If South Korea had cooperated closely with the United States, it would not have experienced controversies over the deployment of Terminal High Altitude Defense (THAAD) and could have constructed a more reliable BMD. South Korea should seek close cooperation with the US, if it wants to defend its people from a possible North Korean nuclear missile attack.

Keywords: Ballistic Missile Defense (BMD), national security, inter-Korean relations, Japan-US relations, Korea-US relations

1. INTRODUCTION

Hope for denuclearization of North Korea once soared in the wake of two summit meetings. The first one was between the South Korean President Moon Jae-in and North Korean leader Kim Jong-eun on April 27, 2018. The second one was between US President Donald J. Trump and Kim when they agreed on a "complete denuclearization on the Korean Peninsula" in Singapore on June 12, 2018.

However, North Korea has yet to take decisive measures regarding denuclearization such as providing information on the number of its nuclear weapons and locations of its key nuclear and missile facilities. It reemphasized its will for the denuclearization to the South Koreans at another summit meeting between the two Koreas on 19 September 2018, but demanded relevant measures from the US. Despite the South Korean government's sincere efforts to lead North Korea into a genuine denuclearization path, the realization of North Korean denuclearization would take more time than expected. It would be prudent for South Korea, the US and Japan to go back to their previous deterrence and defense posture until they see clear and concrete evidence of North Korean denuclearization.

In particular, South Korea, which has been under direct North Korean nuclear threat for years, should put more attention to its Ballistic Missile Defense (BMD) in parallel with its continuous and sincere diplomatic efforts for North Korean denuclearization. The BMD is supposed to intercept the incoming missiles in the air and is considered a purely defensive measure against the worst-case scenario. South Korea should improve its BMD capabilities

as a "Plan B", while trying to persuade North Korea into giving up nuclear weapons through dialogue and negotiations. In this sense, South Korea needs to check its current BMD capabilities and try to find a better option in strengthening its BMD.

South Korea has been trying to build its own BMD in the name of the Korea Air and Missile Defense (KAMD) since the early 1990s, when it witnessed huge casualties caused by Iranian missile attacks in the Gulf War in 1991. However, the actual BMD construction pace and scope has been relatively slow and limited compared to the fast pace of North Korean nuclear development. South Korea has, at this point, only eight batteries of Patriot Advanced Capabilities (PAC)-2 interceptor missiles, which originally were manufactured to destroy incoming aircraft and has been in the course of being upgraded to PAC-3 missiles to equip a hit-to-kill capability against incoming missiles. By contrast, Japan, which faces the same North Korean nuclear threat as South Korea, succeeded in building relatively robust BMD capabilities with more than twenty PAC-2/PAC-3 batteries and at least six AEGIS ships that are armed with Standard Missile (SM)-3 missiles to intercept attacking missiles. Japan made a decision to purchase the SM-3 Ashore system to intercept the incoming missiles one more time on the ground. If we compare the BMD capabilities of South Korea and Japan, the former can try one time limited interception only, whereas the latter two times interception now and three times in a few years. South Korea must analyze the reason why this kind of gap occurred in comparison to Japan's BMD and see if its BMD construction strategy has been relevant.

Fortunately, the US military managed to deploy its Terminal High Altitude Area Defense (THAAD) Battery in southeastern South Korea in early 2018. The United States could deploy its Navy destroyers armed with SM-3 sea-based interceptors to the South Korean sea in case of a crisis. However, both of them cannot intercept North Korean short-range ballistic missiles and can cover only the upper-tier defense for the certain part of South Korea. They could move out of South Korea quickly, if the United States decides to do so for any reason. Furthermore, what I would like to discuss in this paper is not the ROK (Republic of Korea)-US or US-Japan combined BMD posture but Japan's and South Korea's own BMD capabilities.

There could be various reasons for the gap in BMD capabilities of South Korea and Japan. However, I would like to focus on one, possibly, main cause of the gap, which I think is the different approach of South Korea and Japan toward the BMD cooperation with the United States. South Korea adopted self-reliant BMD construction strategy and has been reluctant to cooperate with the United States. To the contrary, Japan adopted a cooperative BMD construction strategy with the United States and has pursued very close BMD cooperation with the United States since the beginning. It is very rational to suspect that the difference between these BMD construction strategies of South Korea and Japan may have resulted in current gap in their BMD capabilities, because the United States has been the sole leader in modern BMD construction.

There has not been much research on Japanese BMD in South Korea, although South Korea and Japan share North Korea nuclear and missile threats. Only a few research papers have published since the 2000s (Kim, 2014: 3-30; Nam and Lee, 2010: 63-94). Park Hwee-rhak compares the BMDs of South Korea and Japan, using the four elements of threat recognition, cooperation with the United States, basic concept and actual capabilities in 2015 (Park, 2015: 3-32). He expanded the comparison to include Israel in 2016 (Park, 2016: 195-223) and identified several misperceptions surrounding BMD construction in South Korea through comparison to Japan's BMD (Park, 2017: 7-34). However, the above analyses

stopped at an in-a-nutshell comparison and failed to focus on specific aspects of BMD such as construction strategy and/or operation mechanism. Filling this gap, this paper will single out the BMD construction strategies of two countries as a research problem and identify differences in their respective approaches to BMD cooperation with the United States.

Therefore, this paper will revisit the concept of BMD mainly by using examples from the US, which has been the sole leader in this area. It will assess the level of BMD cooperation of South Korea to that of Japan by using strategy, result and analysis elements as a way to compare the BMD construction strategies of the two countries. The timeframe for this comparison is from the beginning of BMD discussions of the two countries in the 1990s to April 2018, when South Korea and North Korea jointly declared the "complete denuclearization on the Korean Peninsula" at Panmunjom.

One caveat of this paper is that the South Korean and Japanese BMDs may have been influenced by international politics, especially in Northeast Asia. For example, South Korea delayed the deployment of the US THAAD missile interceptors for about three years because of strong opposition by China. However, if we include the international aspects in this BMD analysis, the focus of this paper could be dispersed. In this sense, I will leave the international political factors for other research.

2. THE BASICS OF THE US BALLISTIC MISSILE DEFENSE

The creation of the BMD concept and development of equipment for it were almost solely conducted by the US. The US was gravely concerned about a possible missile attack to its mainland and oversea troops by a nuclear power rival or few rogue states. Since the US has been a mutual ally of South Korea and Japan for about 70 years, the two countries learned their knowledge on BMD mostly from the US military. In this sense, we need to begin our discussion on BMD from the background, concept and organization of the US BMD.

2.1 Background

A BMD concept was introduced in the US just after the Soviet Union developed its nuclear weapons in the 1950s. "At its inception, ballistic missile defense was regarded by many as a natural extension of the concept concerning guided missile systems for air defense" (Flax, 1985: 34). However, the concept could not be realized because of technological difficulties in intercepting fast moving ballistic missiles in the air, in spite of U.S. President Ronald Reagan's ambitious Strategic Defense Initiative, which was called "Star Wars" on March 23, 1983.

The importance of BMD, especially the one for the US soldiers deployed to the war zone, was highlighted at the Persian Gulf War in 1991, when Iraqi missiles hit a US military base and killed 27 and wounded 98 US soldiers by one Scud missile. The US felt the necessity to improve its BMD capabilities on the theater level, because then deployed PAC-2 anti-aircraft interceptor missiles could destroy only 9% of the Iraqi Scud missiles effectively (Union of Concerned Scientists, 2018). As a result, the US Department of Defense reorganized the Strategic Defense Initiative Organization into Ballistic Missile Defense Organization (BMDO) in 1991 and the US Congress demanded its government to build a more reliable BMD for American people and soldiers abroad during the Bill Clinton administration (1993-2001). However, President Clinton refused to pursue the BMD for its mainland and continued the

theater level BMD only.

The George W. Bush Administration (2001-2009) started to construct a more comprehensive BMD for the US people and troops abroad based on its presidential campaign pledge. It reinforced the BMD effort in the wake of the September 11, 2001 terrorist attack onto the mainland U.S. and expanded the existing BMDO into Missile Defense Agency (MDA) in January 2002 and gave the mission "to defense the US, its deployed forces, allies and friends from ballistic missiles of all ranges and in all phases of flight (MDA, 2005). In addition, it withdrew from the Anti-Ballistic Missile (ABM) Treaty, which was signed with the Soviet Union in 1972 and banned BMD construction for the entire US mainland, in June 2002 and tried hard to develop effective interceptors for its BMD. Also, it installed the first missile interceptors in silos at Fort Greely, Alaska on July 22, 2004 and conducted numerous tests to improve the reliability of the interceptors (Union of Concerned Scientists, 2018). Since then, the US and the world have entered into an era of BMD for deterrence and defense from a possible missile attack including nuclear one.

2.2 BMD for the US Mainland

The US has been trying to have a BMD capability in order to defend its homeland from a "limited" ballistic missile attack possibly by North Korea or Iran (Department of Defense, 2010: 11), because it is almost impossible to intercept hundreds of Russian and Chinese nuclear Intercontinental Ballistic Missiles (ICBMs). From an American perspective, the main point of having a BMD was to intercept a few incoming ICBMs in the midcourse of their flight before reaching the US homeland. Thus, the US developed Ground-based Midcourse Defense (GMD) systems, deployed the developed systems quickly and improved the quality of the systems continuously after its deployment. The US has 4 Ground-based Interceptors (GBIs) at Vandenberg Air Force Base, California and 40 GBIs at Ft. Greely, Alaska now (MDA, 2018).

There has been arguments on the effectiveness of GBIs, since their introduction. The critics argued that it was vulnerable to a wide range of simple countermeasures by the enemy, test programs did not reflect the real-world situation (Lewis, 2017). Actually, Russia demonstrated its hyper-sonic speed attack missiles such as Kinzal in March and August 2018. The Kinzal missile succeeded to flight faster than ten times of the speed of sound and exceeded the level to be intercepted by existing US GBIs (TASS, August 7, 2018). Therefore, the US had to start to replace current GBI kill vehicles with redesigned ones, which could be more easily producible, cheaper and more reliable. The new kill vehicle will likely commence flight-testing in 2019, with an intercept test in 2020 and an initial deployment in late 2021 or perhaps 2022 (Williams, 2018). As a result, another arms race between spears (attacking missiles) and shields (defending interceptors) has been intensified.

The main purpose of the US BMD for its homeland is to protect its people and territory from a possible nuclear missile attack, but it becomes as much a necessary measure to protect its allies as to protect its people. The BMD is essential for the "escalation dominance" against any adversary, which attacks the US ally. In other words, the US should be able to protect its people from an adversary's nuclear attack to itself, if it wants to retaliate for an attack to its ally with its full force (Frühling, 2016: 84). In this sense, the US BMD for its homeland is closely connected to the US global strategy and alliance policies.

2.3 BMD for Overseas Troops and Allies

The US military developed three phases of BMD concept to defend its deployed forces and allies. They were a boost phase defense, an upper-tier terminal defense and a lower-tier terminal defense. It has developed relevant interceptor missiles to cover these phases and increase the probability of interception through multi-tier defense.

Because of the low feasibility of the boost phase defense, the US military has focused on upper-tier and lower-tier defenses in terminal phase. The upper-tier defense was designed to intercept the missile both within the atmosphere and outside the atmosphere (Allen, 2001: 7). The US developed the THAAD interceptor missile as a weapon system for this purpose. This THAAD could intercept incoming missiles at 40km to 150km altitude, which means that it cannot intercept short-range ballistic missiles that come in at lower than the minimum engagement altitude of it, which is about 40km (Elleman and Zagurek, 2016).

The lower-tier defense is designed to intercept missiles within the atmosphere, employ relatively slow-flying interceptors and is only effective for point defense to cover small areas from short-range ballistic missiles (Allen, 2001: 3). Many lower-tier interceptors are required in order to defend the entire country because of their relatively short range. The US military developed the PAC-3 interceptor missile for this lower-tier defense and has been improving the capability of the PAC-3 through PAC-3 Missile Segment Enhancement (MSE) (Japan Ministry of Defense, 2014: 193). This lower-tier defense should be regarded to be a complementary, plan B or reserve measure for upper-tier defense.

The US has about twenty Navy vessels armed with SM-3 Afloat interceptors in Pacific Fleet and sixteen in Atlantic Fleet. The SM-3 could cover intermediate-range ballistic missiles in the midcourse and upper-tier defense in the terminal phase. The US has one SM-3 Ashore interceptors in Romania with similar capabilities to SM-3 Afloat. The US has six THAAD batteries including one deployed to Guam and one deployed to South Korea as the upper-tier defense in the terminal phase for its overseas troops. The US also has fifteen PAC-3 battalions (about sixty batteries) to defend its troops around the world as a lower-tier defense in the terminal phase. The US sold two THAAD batteries to the United Arab Emirates and lots of PAC-3 batteries to its allies (Missile Defense Advocacy Alliance, 2018a). This US BMD should be closely coordinated with the BMDs of its allies, because the US forces stay in the territories of their allies. In this sense, the US adopted a Phased Adaptive Approach to encourage BMD cooperation with its allies in a way to respect their policies on their BMD and their different situations (Rinehart, 2015: 3). South Korea and Japan must be the first candidates for BMD cooperation with the US, since they host about 28,500 and 50,200 US forces respectively and commonly face the North Korean missile threat.

Several US partners and allies, such as Australia, Bahrain, the Czech Republic, Denmark, France, Germany, Israel, Italy, Japan, Jordan, Oman, Poland, Qatar, Romania, Saudi Arabia, Spain, Taiwan, Turkey, Ukraine, United Arab Emirates and the United Kingdom bought PAC-2 or PAC-3 interceptor missiles from the US (Missile Defense Advocacy Alliance, 2018b). China and Russia appears to have been developing their own BMDs in response to the US initiatives. Thus, the world has started the competition to have more reliable BMD systems than other countries in order to ensure necessary strategic advantages in terms of BMD for their people.

3. NORTH KOREAN NUCLEAR MISSILE THREAT AND CHALLENGES

3.1 North Korean Nuclear Missile Threat

North Korea has conducted six nuclear explosion tests since October 9, 2006. It declared its successful nuclear weapons development by announcing that "it used a small and light atomic bomb…[and] acquired an excellent nuclear deterrent power" after its third test on February 12, 2013 (Chosun Ilbo, February 13, 2013: A1). North Korea conducted another two tests before having a hydrogen bomb explosion test – the sixth one – on September 3, 2017. An expert admitted that it was a real hydrogen bomb explosion and estimated the yields between 108 and 250 kilotons (Zagurek, 2017). A US expert on North Korean nuclear development, Dr. David Albright, evaluated that North Korea might have thirteen to thirty nuclear weapons as of the end of 2016 (Albright, 2017) and another expert assessed 20-25 as of September 2017 (Zagurek, 2017). A Russian military expert told that North Korea had 30-35 nuclear weapons with the capacity of producing 7-10 nuclear weapons per year (Yonhapnews, June 11, 2018).

Most of North Korean missiles, whether armed with conventional or nuclear warheads, can strike South Korea. Scud-Extended Range (ER) and No Dong missiles can strike considerable parts of Japan, too. The Pukguksong-2 missile (1,200–3,000 km range), which uses solid fuel, could strike South Korea and Japan in less than five minutes after the decision-making of a launch. Furthermore, North Korea succeeded in the test-fire of Hwasung-12, which actually flew 3,700 km range on September 16, 2017. Thus, Guam, a US territory accommodating important military bases and just 3,400 km away from Pyongyang, the North Korean capital, could be a direct target for a North Korean nuclear missile attack. Okinawa, a Japanese island of 1,700km from Pyongyang and with many US forces stationing, could also be hit by North Korean nuclear missiles.

North Korea has been attempting to develop long-range ballistic missiles that could strike the US mainland and developed a very powerful engine for these missiles. It test-fired two Hwasung-14 ballistic missiles in July 2017 and finally test-fired Hwasung-15 with the altitude of 4,475 km and range of 950 km by using a lofted trajectory on November 29, 2017 (Chosun Ilbo, November 30, 2017: A1). The Hwasung-15 was evaluated to be able to strike the most part of the US, if it had used a minimum energy trajectory. North Korea officially declared "the completion of national nuclear power" just after the test. Because of this test, the US government officially recognized that North Korea was "a few months away" from the completion of its ICBM (Department of Defense, 2018: 11).

Although the denuclearization negotiation between the US and North Korea has been pursued since the summit meeting between the US president and North Korean leader in Singapore on June 12, 2018, it is premature to stop preparation for a possible North Korean nuclear missile attack. North Korea did not come up with any proposal or plan to implement its promised denuclearization. On the contrary, it continues its production of its nuclear weapons, nuclear material and long-range missiles despite the ongoing negotiations. Although there seems to be various efforts to continue the negotiation and produce some results, the results remain uncertain. The construction of BMD shields could be the most peaceful and reliable option for the uncertainty.

3.2 Challenges

North Korea has become a serious security threat to South Korea, Japan and the US for seventy years. North Korea has the ability to strike South Korea, Japan and Guam with its nuclear missiles. It could even strike the mainland US in the near future with its nuclear-topped ballistic missiles. If North Korea manages to have the capability to strike a few cities in the US with its hydrogen bombs, the US may not be able to retaliate against a North Korean attack to South Korea and/or Japan. The US should dare to receive a possible North Korean nuclear attack to its cities in return for its support to South Korea and Japan. Thus, South Korea and Japan would be well advised to defend themselves, while strengthening the US's protection through extended deterrence mechanism. At the same time, a reliable BMD can increase availability of options to control escalation in conflicts including a nuclear war (Frühling, 2016: 93). Therefore, the independent BMD capabilities of two countries have become a vital and indispensable task for them.

In theory, there are several other options for South Korea and Japan to defend their people from potential North Korean missile attacks including nuclear attacks. They could conduct a preventive or preemptive strike to eliminate North Korean nuclear capabilities in advance. However, these options could be very risky, because North Korea could retaliate with its nuclear missiles if the strike fails to destroy all North Korean nuclear weapons in one attempt. The US and South Korea gave up their surgical strike option to North Korean nuclear power plant in 1994, because of the possibility of North Korean conventional retaliation (Carter and Perry, 1999: 129). Moreover, it is very difficult to obtain perfect intelligence about targets to ensure the success of strikes. At the same time, the BMD capabilities are necessary as a "plan B" in case of failure of the preventive or preemptive strikes.

Actually, South Korean and Japanese militaries have tried to construct BMD shields as an important defense measure against the North Korean missiles and/or nuclear threat. One thing worth noting is that they selected very different strategies for the construction of their BMDs. South Korea refrained from cooperation with the US in building up its BMD, though it learned and adopted the BMD concept of the US. To the contrary, Japan pursued full cooperation with the US in its BMD construction and operations. Although there may be various reasons that caused the different levels of South Korea's BMD and Japan's, this difference of strategy could be an influential one. In this sense, it will be useful to compare the two different strategies of South Korea and Japan and draw some lessons for South Korea

4. JAPAN'S BMD CONSTRUCTION STRATEGY: COOPERATION WITH THE UNITED STATES

4.1 Implementation

Japan began its cooperation on BMD with the US when the President Ronald Reagan started his Strategic Defense Initiative in 1983. Industrial companies of the two countries organized the Western Pacific Missile Defense Architecture Study (WESTPAC) and recommended a defense architecture against a probable North Korean ballistic missile attack (Ibrahim, Ahmad and Iberahim, 2013: 81). Based on this experience, Japan organized a Theater Missile Defense Working Group with US experts just after North Korea announced its withdrawal from the Nuclear Non-Proliferation Treaty in 1993. The US side presented

Japan with a 40-page document called "Japan's Choices Regarding Theater Missile Defense" including a few options for Japan and routes for collaboration with the US (Van, 2014: 20-21). Based on the recommendations, the Japanese Ministry of Defense produced a report entitled "On Research Concerning Ballistic Missile Defense" in August 1995 and stressed the need for BMD (Ibrahim et al., 2013: 81).

Japan had to make a decision regarding its BMD when it witnessed the flight of North Korean Taepodong-1 missile on August 31, 1998. This missile, referred to as Kwangmyongsong-1 by North Korea, flew 1,600km over Japanese airspace. The "Taepodong Shock" changed Japan's previous cautious attitude on BMD (Sankaran, 2017: 7-8). Japan reinforced the joint research project with the US experts and planned to spend 2.2 billion dollars for researches on its BMD between 1999 and 2005 (Norifumi, 2006: 1-17). Although a potential Chinese missile threat was discussed in Japan at the same time, the imminent North Korean missile threat was the decisive impetus for the Japanese BMD (Matej, 2016: 244).

The Japanese National Security Council and Cabinet Meeting decided on the blueprint and roadmap for its BMD in December 2003, based on recommendations submitted by the joint Japanese–US research team. The key elements of the roadmap involved purchasing the SM-3 (Block IA) sea-based upper-tier interceptor missiles as the first layer of terminal phase defense and the PAC-3 ground-based lower-tier interceptor missiles as the second layer of defense. Japan also decided to develop its own radar systems to detect and track incoming missiles. It believed that having a reliable BMD shield was the most urgent and effective measure to defend its people from a possible North Korean missile attack and tried hard to construct its BMD as rapidly as possible.

Japan also recognized the necessity of close cooperation and coordination with the BMD operations of US forces. Such cooperation and coordination was thought to be an indispensable condition for the effective interception of incoming missiles within a very limited time. Japanese and US forces established the Bilateral Joint Operation Coordination Center at the Yokota Air Base near Tokyo in October 2005. They deployed the US AN/TPY-2 X-band radar at the Shariki Japanese Self-defense Force (JSDF) base to provide an early warning against North Korean missile attacks and began sharing information about the North Korean nuclear and missile threat. In December 2005, they agreed to develop jointly a more advanced version of SM-3 (Block IIA), which may be able to intercept Chinese ICBMs if successfully developed (Takahashi, 2012: 11).

Japan decided to expedite the construction of its BMD when North Korea test-fired seven ballistic missiles, including the Taepodong-2 missile, at one time on July 5, 2006. Although the Taepodong-2 missile exploded forty seconds after its test launch, it was estimated to have the ability to reach approximately 6,700 km if it had flown as planned. The JSDF accelerated its BMD construction by deploying its first PAC-3 battery near Tokyo in March 2007, earlier than originally planned. It conducted four live intercept tests in coordination with the US Missile Defense Agency at the Pacific Missile Range Facility in Hawaii annually from 2007-2010 (Ellison and Williams, 2015: 1). In addition, it started its combined BMD exercises with US forces in 2010 (Japan Ministry of Defense, 2016: 9).

Japan managed to have basic BMD capability in the late 2000s. Based on this, Japanese government ordered JSDF to be prepared for an interception when North Korea test fired long-range ballistic missiles in March 2009, March 2012 and February 2016. JSDF maintained its Aegis ships with SM-3 and the PAC-3 batteries to be in battle mode (Japan Ministry of Defense, 2016: 292-293). North Korea's missile test-fires were key events that

led Japan to speed up the construction of its BMD.

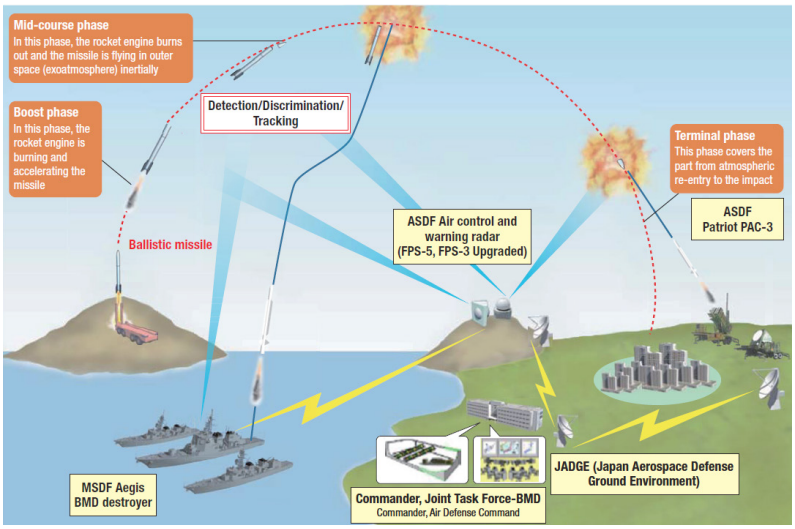
North Korea fired two Hwasung-12 missiles over Hokkaido, Japan on August 29 and September 15, 2017. Japan alerted BMD assets and its people on the launch, though Japan did not try to intercept the missiles. However, Japan decided to acquire SM-3 Ashore from the US in order to add one more layer for its BMD in August. If Japan has the SM-3 Ashore in a few years, it could try three times the level of interception than the current level, against a possible North Korean missile attack.

4.2 Results

The current concept of Japanese BMD is to allocate the upper-tier terminal phase defense to sea-based SM-3 interceptors and the lower-tier defense to ground-based PAC-3 interceptors. Japan will add another upper-tier defense on the ground by acquiring SM-3 Ashore in a few years. These defenses are to be controlled by the Japan Aerospace Ground Environment (JADGE). If an enemy attacks Japan with ballistic missiles, SM-3 sea-based interceptors will shoot down the attacking missiles first, the SM-3 Ashore ground-based interceptors would try the second in the future and PAC-3 interceptors will shoot them down if the SM-3s fail. The interception operations in the field were supposed to be controlled by the Commander of Air Defense Command as the head of the Joint Task Force-BMD, which would be established when the ballistic missile threat seemed probable (Japan Ministry of Defense, 2016: 290). The Japanese Ministry of Defense depicts its BMD concept as shown in Figure 1.

To implement the above concept, Japan has six Aegis destroyers with SM-3 sea-based missile interceptors now. It will add two more Aegis destroyers soon. Japan has about twenty seven PAC-2/PAC-3 batteries to protect its major cities and has been enhancing its PAC-3 capabilities to deal with North Korea's faster missiles. The US usually deploys about seven Aegis destroyers with SM-3 interceptors and four PAC-3 batteries in and around Japan

Figure 1. Japanese BMD concept



Source: Japan Ministry of Defense, 2017: 328.

(Missile Defense Advocacy Alliance, 2018a). Japan will have about two sets of SM-3 Ashore interceptors in a few years. It has also been developing SM-3 Block IIA, which would have farther and more accurate interception capabilities than the current SM-3 Block IA. Japan has been sharing the two sets of the US AN/TPY-2 radar systems in the country since 2006 and enhanced its own radar systems – FPS-3 and FPS-5 – continuously. Japan has succeeded in constructing a relatively reliable BMD shield, which could track and destroy a significant fraction of an early salvo of North Korean missiles, though it needs more build-up to defend the whole North Korea missiles (Sankaran, 2017: 7-8).

4.3 Analysis

Japan asked the US for help just after North Korea announced its withdrawal from the NPT in 1993 and started joint research on BMD instantaneously. "Missile defense in Japan has never been considered independent of the United States" (Van, 2014: 30). Japan reinforced its BMD cooperation with the US in 1998, when a North Korean Taepodong-1 missile flew over Japan. Japan and the US officially signed an agreement focusing on BMD cooperation in 1999 (Hoff, 2015: 4). Based on this agreement and other cooperative consultations, Japan decided on a blueprint and roadmap for its BMD. The US provided licensed production for PAC-3 systems and sold the SM-3 interceptors to Japan as a first foreign sale (Hoff, 2015: 3-45). The US focused on the technology and budget and Japan produced the parts regarding the production of SM-3 Block IIA. Japan reciprocated the US' cooperation by allowing the US to export the final products of the SM-3 Block IIA to the third county (maybe other US allies) after the project's success (Japan Ministry of Defense, 2016: 292-293). The US was a teacher and Japan was a good student when it comes to Japanese BMD construction.

Japan did not hesitate when the US wanted to deploy its AN/TPY-2 radars, which could be used independently for surveillance or jointly with THAAD for interception. It took Japan and the US about a year to deploy their first AN/tpy-2 radar and the second radar about two years. There was no significant oppositions except for minor arguments and demands from Japanese people on the deployment. Japan did its best to construct its BMD shield as soon as possible by actively accommodating US assets, assistance and technology.

Japan even tried to help the US to protect the US mainland from a potential long-range missile threat. The two countries jointly developed SM-3 Block IIA, which could intercept some ICBMs before US ground-based interceptors in Alaska or California. That was the reason why some experts have raised the argument that this joint development could breach Article 9 of the Japanese Constitution (Matej, 2016: 244). The US was satisfied with Japan's participation in the SM-3 Block IIA development and provided most of the funding and technology for the project (Hoff, 2015: 5). Japan did not hesitate to become a part of the US global BMD in exchange for the US's full cooperation for its own BMD.

Japan integrated its BMD operations with those of the US forces in Japan. Japan and the US forces share two sets of AN/TPY-2 radar and coordinate defense areas for each country's PAC-3 systems. The US SM-3 Aegis ships have been operating in the sea near Japan in coordination with Japan's SM-3 Aegis ships. Japan also integrated the command and control element of its BMD with the US forces' Joint Tactical Ground Station. In addition, Japan has conducted combined BMD exercises with the US forces since 2010 using actual weapon systems (Japan Ministry of Defense, 2016: 292). Japan wanted to make the most of its BMD capabilities by "greater integration and cooperation between its three services and with the

United States" (Ellison & Williams, 2014: 4). If North Korea attacks Japan with missiles, the JSDF and the US military will shoot down them with a perfect unity of command and coordination in the field.

5. SOUTH KOREA'S BMD CONSTRUCTION STRATEGY: SELF-RELIANCE

5.1 Implementation

South Korea recognized the necessity of BMD after witnessing the Iraqi ballistic missile attack on US forces during the Gulf War in 1991. North Korea's announcement of its withdrawal from the NPT in 1993 strengthened its resolve. However, South Korean discussions on its BMD were slowed by the start of the so-called "Sunshine Policy," which emphasized rapprochement with North Korea in 1998. Then-South Korean Minister of National Defense, Chun Yeong-taek, told the press that the US BMD concept was not appropriate to South Korea on March 5, 1999. Then President Kim Dae-jung also said to CNN news channel that South Korea would not participate in the US BMD on May 5 (*Munhwa Ilbo*, May 6, 1999). He believed that the two Koreas could be unified; thus, it disregarded the potential danger of North Korea's nuclear development and did not mention BMD much (Lee, 2006: 142-157).

As a contrast, US President George W. Bush, emphasized a conservative stance on North Korea and reinforced BMD construction in 2001. The South Korean and US governments had difficulty in coordinating their North Korea policies, including their BMD against a possible North Korean missile attack. As a result, the South Korean military created the concept of Korea Air and Missile Defense (KAMD), which added partial BMD to its traditional air defense. The KAMD included only lower-tier terminal phase defense. This South Korean BMD policy continued during the Roh Moo-hyun administration from 2003-2008. The Roh administration decided to purchase ground-based PAC-2 (via Germany, not directly from the US) and sea-based SM-2 anti-aircraft interceptor missiles instead of PAC-3 and SM-3 anti-missile interceptors. South Korea was reluctant in the construction of its BMD and adopted self-reliant strategy under the title of KAMD.

Although subsequent administrations in South Korea, Lee Myung-bak and Park Geun-hye administrations, represented conservative stances toward North Korea, the strategy and policies regarding the KAMD did not change. Both administrations maintained the concept of KAMD and did not pursue active cooperation with the US for their BMD. The South Korean military, however, acquired two sets of Green Pine radar from Israel (not the US) during the Lee administration. It also established its own BMD command and control cell separate from the US one and decided to upgrade its PAC-2 interceptors into PAC-3 interceptors in order to add hit-to-kill capabilities for missile interception. However, it did not coordinate the deployment and operation of its PAC-3s with the US forces in Korea (USFK), which had several PAC-3 batteries.

The South Korean military added the upper-tier terminal phase defense to its KAMD concept during the Park Administration (Ministry of National Defense, 2016: 71). However, it did not consider the purchase of the US BMD equipment or technology. Instead, it decided to develop its own upper-tier defense equipment until the mid-2020s under the name of Long-Range Surface-to-Air Missile (L-SAM). It also decided to develop its own lower-tier defense system under the name of Medium-Range Surface-to-Air Missile (M-SAM), instead

of acquiring the already developed US equipment for rapid BMD construction (Ministry of National Defense, 2016: 71). South Korea did not put much emphasis on the speed of its BMD construction, while focusing on self-reliance.

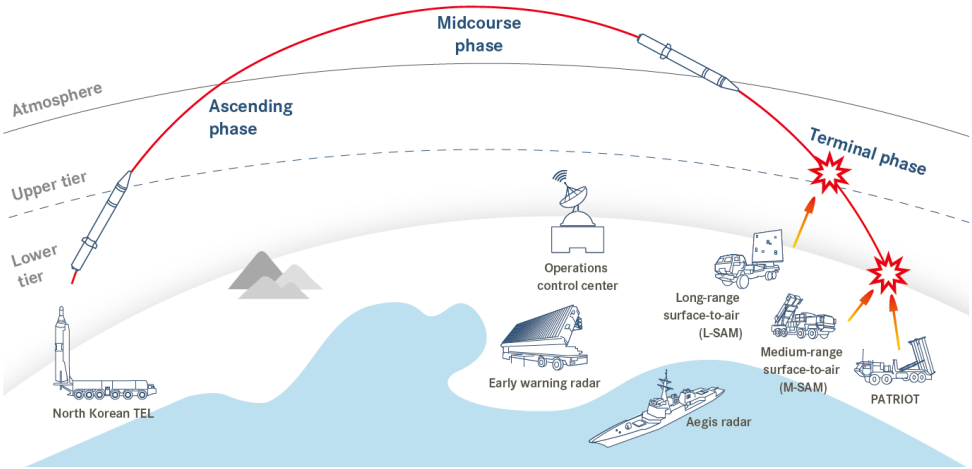
5.2 Results

The current goal of the KAMD is to get two interception opportunities against incoming ballistic missiles in the air. That concept is shown in Figure 2. However, the concept itself appears to involve a few confusing elements. It seems to borrow the ascending phase and midcourse phase from the BMD concept of the US mainland, which is irrelevant for the defense against North Korean short- and medium-range missiles. South Korea uses its Aegis ships only for its radar system. The KAMD concept itself has several aspects to be improved.

In terms of BMD capabilities, South Korea has currently two battalions (eight batteries) of PAC-2 ground-based aircraft interceptors, which have been being upgraded to PAC-3 missile interceptors, with expected completion in 2020. Although South Korea succeeded in developing M-SAM, which could cover the lower-tier defense with PAC-3, it should invest more money and time to produce sufficient numbers for reliable lower-tier protection for major cities. South Korea must overcome several technological difficulties and wait for more time before having an operational L-SAM, which may provide a middle-tier terminal phase defense or part of an upper-tier defense. The KAMD could protect only parts of South Korea and its people.

The US THAAD system, which was deployed to South Korea in April 2017 after heated debate on the deployment for almost three years, provides upper-tier terminal phase defense for about 1/3 of South Korean territory. “The deployment of one or two THAAD batteries in South Korea would substantially enhance its capacity to defend against a North Korean missile attack” (Elleman and Zagurek, 2016), but the THAAD system cannot intercept short-range ballistic missiles, which fly under its minimum engagement altitude. In this sense, it cannot effectively defend Seoul, the South Korean capital, which lies just 40km away from

Figure 2. Concept of South Korean BMD



Source: Ministry of National Defense, 2016: 71.

North Korean border, due to the low trajectory of North Korean short-range missiles and lack of response time. The THAAD system should be complemented by several lower-tier defense equipment and Seoul, the largest city in South Korea, should have its own tailored BMD systems to defend its citizens.

Although South Korea and the USFK share same area of operation on the Korean Peninsula, they do not have an effective mechanism to ensure unity of command. "Despite almost two decades of urgings from the US to build an integrated BMD architecture, the two systems have remained separate" (Pollack, 2017: 7). In addition, the KAMD operation center does not have a reliable back-up system. If North Korea attacks South Korea with its ballistic missiles, South Korea and the USFK may have difficulty integrating all the information, making timely decisions regarding interception, allocating targets and launchers, and developing a back-up plan because of their lack of unity of command regarding BMD operations on the Korean Peninsula.

5.3 Analysis

Just after the Gulf War, South Korea was very active toward its BMD cooperation with the US; it considered buying Patriot interceptor missiles from the US (Allen, 2001: 34). However, South Koreans' effort for the rapprochement with North Korea changed the mood to the opposite direction. Kim Dae-jung administration made it clear that South Korea would not seek cooperation with the US regarding its defenses against North Korean missiles. Since then, South Korea has constructed its BMD in a self-reliant way, which was totally different from the Japanese BMD construction strategy as discussed in the previous chapter.

The push for comprehensive BMD by President Bush could not lead to any changes in the existing South Korean self-reliant BMD construction strategy. Even the Lee and Park administrations did not change the strategy. South Korean defense officials thought that the US and Japan's joint missile defense system was not fit for a peninsular environment and too expensive (Karen, 2014: 1). As a result, South Korea did not put much emphasis on the multi-layered defense concept and depended only on a lower-tier defense (Karen, 2014: 7).

The KAMD came to have some defects partly due to its lack of cooperation with the US BMD. It was evaluated that it "seems to have had little in the way of a consistent system design…(and) has emerged as a patchwork quilt … its only fixed characteristic is the first word in its name: *Korean*" (Pollack, 2017: 7). It did not adopt the multi-layered defense concept, which was a basic regarding BMD worldwide. Instead, "South Korean defense officials have improvised a meandering course on BMD development and acquisition" (Pollack, 2017: 7). If South Korea had had close cooperation with the US like Japan did from the beginning, it could have a more realistic BMD blueprint and spent its money more efficiently.

6. ANALYSIS AND LESSONS FOR SOUTH KOREA

Although South Korea and Japan learned generally from the same BMD concept of the US, they resulted in very different BMD capabilities. Japan can make two attempts of hit-to-kill defense for its almost entire territory against incoming North Korean missiles with its SM-3 and PAC-3 interceptors now. In contrast, South Korea can expect only one hit (not hit-to-kill) opportunity for only part of its territory with its PAC-2 anti-aircraft interceptors now.

Japan is acquiring the SM-3 Ashore to add one more hit-to-kill opportunity, whereas South Korea has lots of uncertainty regarding its L-SAM upper-tier interceptor. Why is there this kind of BMD capability gap was created between the two countries?

6.1 Causes of the BMD Gap

Some could argue that the gap between South Korean and Japanese resources and levels of technology could have partially contributed to the current BMD capability gap between the two countries. However, Japan's defense budget is just approximately 25% higher than South Korea's. For example, the Japanese defense budget was 46,126 million dollars and South Korean 36,777 million dollars, respectively, in 2017 (SIPRI, 2018). The technological level of the two countries could not affect the level of BMDs significantly because most BMD equipment was developed by the US and, therefore, two countries should buy them. In this sense, we could conclude that the existence and/or quality of the two countries' BMD cooperation with the US could be the decisive factor that created the current significant gap in BMDs of two countries. Chapters IV and V of this paper provided lots of evidences of this conclusion.

The different approaches of South Korea and Japan toward their BMD cooperation with the US may have something to do with their different threat perceptions, especially regarding alliance motivation and China (Wong, 2016: 144-150). For example, South Korea tried to change North Korea from a threat into a unification partner through its rapprochement approaches. South Korea did not feel it necessary to take precautionary measures against a Chinese potential threat, which is totally different from the Japanese perceptive. However, these differences cannot explain the huge gap in the level of BMD cooperation with the US between the two countries.

One peculiar finding regarding the weak cooperation between South Korean KAMD and the US BMD was the strong influence of civilian activists, who desperately opposed to cooperation with the US. They vehemently argued that the South Korean BMD would be a part of the US global BMD, if it was constructed by the help of the US (Yoo, 2018). They accused the deployment of the THAAD of South Korean participation in the US BMD. These opposing arguments succeeded in gaining South Koreans' support as 42.3% of South Korean people opposed the deployment of the THAAD as of early 2016 (Realmeter, 2016). The South Korean military could not pursue any cooperation with the US for speedy construction of its KAMD because of negative public opinion.

If South Korea had begun developing its BMD through full cooperation with the US as Japan did, it would not have developed the concept such as KAMD, which considered BMD operation a part of anti-aircraft defense. It would not have bought PAC-2 and SM-2 anti-aircraft interceptor missiles instead of PAC-3 and SM-3 anti-missile interceptor missiles, which Japan bought during the same period. The controversy over the deployment of the THAAD system would not have occurred. The South Korean self-reliant BMD construction strategy has caused significant inefficiency in its BMD construction, especially compared to Japan.

Anti-US emotion among South Koreans affected their negative opinions on their BMD cooperation with the US. Negative sentiments on the US among South Koreans increased gradually from 20%–30% in the 1990s and reached 50% in 2003(Oh, 2015: 189-218), when South Korea decided its basic policies on its BMD. Although the negative sentiment returned to approximately 20% in the late 2000s, the remnants of that negative sentiment seem to have

influenced the thinking of progressive and/or young South Korean people and blocked South Korean BMD cooperation with the US continuously.

The weak professionalism in South Korea's military also could be a cause for the inefficient BMD construction of South Korea. It did not do its best to persuade South Korean people and/or civilian activists regarding the necessity for the close BMD cooperation with the US. Instead, it gave up its cooperation efforts with the US BMD and lowered its BMD objective to only a lower-tier defense. Strangely, there was not much debate on the relevance of the objective and strategy regarding its BMD among military officers. They refrained from discussing on BMD itself, because of negative public sentiment. As a result, there was not much meaningful researches or recommendations for a more reliable BMD shield in the South Korean military.

6.2 Lessons for South Korea

The first and fundamental lesson that South Korea should learn from Japanese BMD case is the usefulness of active BMD cooperation with the US. South Korea could improve its BMD blueprint into a practical and realistic one, if it asks and incorporates advices from the US BMD experts, even now. They could recommend the best BMD option for current South Korean situation and minimum necessary numbers and optimal locations of interceptor missiles. South Korea will expedite the development of its M-SAM and L-SAM projects by acquiring the US's management skills and technologies. Moreover, South Korea should try to find the best solution not alone but with the US, just like Japan did and succeeded.

The South Korean military should focus more on its professional recommendations on BMD than listening to people' opinions. Japanese JSDF only focused on efficient and effective BMD construction to defend its people and did not pay much attention to the non-professional opinions of civilian activists. It used its strong BMD cooperation with the US as a way to realize its objective rapidly and reduced the people's concern through rapid achievements. South Korean military should focus on the construction of a comprehensive BMD quickly and answer the peoples' doubts by producing achievements. There seems to be no more prudent option for the South Korean military than close cooperation with the US BMD, if it wants to make rapid achievements on its KAMD.

Another urgent task for the South Korean military for building-up an effective BMD involves integrating the command and control mechanism of its BMD with that of the US just like Japanese JSDF created the unified BMD operation center with the US military. Unity of command in BMD operations is essential, because South Korea is close to North Korea and the first seconds will determine a mission's success or failure. South Korea and the US may need to appoint one person to be responsible for the overall BMD operations on the Korean Peninsula. They should create an organization for the unified BMD operations and conduct necessary exercises for the operation.

South Korea may also need to pursue BMD cooperation with Japan. By doing so, it can learn from Japanese BMD experiences and acquire accurate intelligence on North Korean nuclear missiles. Since the South Korean military and its Japanese counterpart signed a General Security of Military Information Agreement in November 2016, the two countries could exchange intelligence regarding North Korean nuclear weapons and ballistic missiles and consult each other on effective and combined defensive measures, if necessary. Such cooperation between South Korea and Japan would lead to seamless cooperation on BMD measures among South Korea, Japan and the US and enhance the level of effectiveness

of BMD against North Korean missile threats. There is even a suggestion to create a comprehensive BMD cooperation mechanism in the Asia-Pacific region including Australia and Taiwan (Karako, 2017).

South Korea may need to apply the division of labor concept with the US military regarding its BMD against the North Korean nuclear threat. It could focus on providing lower-tier defense for most major cities, while depending on US forces' equipment, e.g., THAAD, for upper-tier defense. South Korea could concentrate on defending Seoul from a possible North Korean nuclear missile attack, while US forces focus on protecting rear areas of South Korea. Through such a division of labor, South Korea and the US could strengthen their combined BMD shield on the Korean Peninsula with less time and more efficient investments.

7. CONCLUSIONS

Although South Korea and Japan have shared the North Korean nuclear threat, the BMD levels of the two countries have become significantly different. The current level of the South Korean BMD is much lower than that of Japan, though the two countries started the construction at the almost same time. South Korea has only limited one opportunity regarding the interception of a North Korean attacking missile, whereas Japan has two reliable opportunities. This paper found that the difference in BMD levels of the two countries mainly stemmed from their different BMD construction strategies. South Korea has built-up its BMD in a self-reliant way, while Japan has done it in a cooperative way with the US.

Because of its self-reliant strategy, the South Korean military made its KAMD blueprint almost independently with a lower-tier terminal phase defense only, while Japan adopted the US recommendation with multi-layered defense. South Korea established a separate BMD operation center from the USFK, while Japan created a combined one with US forces. South Korea experienced serious trials and errors, which would not have been inevitable, had it cooperated with the US BMD. In this sense, there could be several lessons to learn for South Korea from Japanese BMD construction strategy and results.

As an urgent task, South Korea should review its current KAMD blueprint with US experts, find defects, if any, rectify them as rapidly as possible and come up with a new one. It should rewrite its list and schedule for the acquisition of the necessary equipment to implement the new blueprint. At the same time, it should integrate its BMD operation center with that of the USFK and ask the US companies for a help in developing and fielding of its own missile interceptors, such as M-SAM and L-SAM. It should try to take full advantage of its alliance with the US as it did in the past, when it was overwhelmed by the strong North Korean conventional forces in 1970s and 1980s.

North Korea seems to be very close to gaining the capabilities to attack a few cities on the US mainland with nuclear missiles. If this happens, South Korea would need to defend its people on its own. In that case, the quality of the South Korean BMD could be the final and vital element for South Korean defense against a possible North Korean nuclear attack. If South Korea wants to improve its BMD capabilities in a short period of time against the worst case scenario, it should seek close cooperation with the US BMD in a hurry. It may be the last chance for South Korea to rectify the problems in its BMD, when North Korea stops its launches of missiles as a way to negotiate with South Korea and the US. Without changing its self-reliant BMD construction strategy, South Korea cannot defend its people in case of

North Korean nuclear missile attacks.

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