

THE KOREAN JOURNAL OF SECURITY AFFAIRS

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Bee Yun Jo

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The editorial board of KJSA would like to inform you that the following two papers have been permanently deleted as violations have been confirmed.

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- ° Kwang Ho Chun, Strategic Relevance of Airpower in Counterinsurgency Operations: UK Doctrine in Contemporary Theaters of Conflict (KJSA Vol.21 No.1, June 2016)
- Plagiarism
- ° Jiwon Yun, Russia's Defense Capabilities and Strategy: Development and Characteristics (KJSA Vol.26 No.1, June 2021)
- Redundant Publication

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The P5's Nuclear Pursuit and Nuclear Non-Proliferation Treaty(NPT) at Challenge

Bee Yun Jo 5

Will North Korea Join Russia and China in a Combined Military Exercise?

A Game Changer for Northeast Asian Security Architecture

Youngjun Kim 31

A Study on the Strengthening Space Cooperation between South Korea and the EU

Geunho Song 54

Three Track Approaches to Verify and Destruct North Korea's Biological
Weapons

Ki-Chul Park 73

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The P5's Nuclear Pursuit and Nuclear Non-Proliferation Treaty(NPT) at Challenge

Bee Yun Jo

Abstract

To what extent are the P5s (the United States, Russia, China, France, and the United Kingdom) to blame for the waning of the nuclear non-proliferation regime? While the P5s' renewed nuclear pursuits are debated to be driving the polarizations between the nuclear haves and have-nots, making the nuclear non-proliferation treaty (NPT: Treaty on the Non-Proliferation of Nuclear Weapons) ever brittle, there are few in-depth analysis on recent changes in P5s' nuclear pursuit or restraint. Against this backdrop, the article aims to evaluate and depict the P5s' changing nuclear policy and capabilities. By proposing an analytic bridge between the NPT literature and growing discussion on the new nuclear arms race (new nuclear multipolarity), this article seeks to gauge P5s' nuclear pursuit and/or restraints along three key variables: 1) nuclear doctrine, 2) nuclear capabilities, and 3) nuclear readiness (posture, nuclear command, and control issues).

Key Words: Nuclear Non-proliferation Treaty(NPT), Nuclear modernization, Nuclear Weapons, P5

Introduction

To what extent are the P5s (the United States, Russia, China, France, and the United Kingdom) to blame for the waning of the nuclear non-proliferation regime? While the P5s' renewed nuclear pursuits are debated to be driving the polarizations between the nuclear haves and have-nots, making the nuclear non-proliferation treaty (NPT: Treaty on the Non-Proliferation of Nuclear Weapons) ever brittle, this study finds that existing literature has not fully explored in evaluating and gauging to what extent the P5s' nuclear pursuit or restraint has changed recently. The purpose of this article is not to dispute the weakening of the nuclear proliferation regimes. Instead, this study aims to provide in-depth analysis and empirical evidence on the P5s' changing nuclear policy and capabilities. By proposing an analytic bridge between the NPT literature and growing discussion on the new nuclear arms race (new nuclear multipolarity), ¹⁾ this article seeks to gauge P5s' nuclear pursuit and/or restraints along three key variables. The first variable is nuclear doctrine. Namely, what is the purpose/role of nuclear weapons? Is nuclear strategy more nuclear expansive/offensive vs. nuclear restraint/defensive? What is the position on a No-First-Use (NFU) policy – declaration to not use nuclear weapons first? Has it changed? The next is nuclear capabilities. What are the qualitative and quantitative changes in nuclear weapons (nuclear warheads and delivery platforms)? The last variable is nuclear readiness (posture, nuclear command, and control issues). How many are operational vs. in storage? How many are ready for launch-on-warning? What is the command and control system/structure of the nuclear arsenal?

Through empirical analysis of the three variables, this study concludes that there is a heightened emphasis on nuclear modernization and (re-)appreciation of nuclear capabilities among all the P5s. On the lookout for changing security environment, China appears to be rapidly building up its nuclear arsenal in both qualitative and quantitative terms. Russia's total number of nuclear weapons has not increased; however, we see a rise in the number of deployed operational warheads. US and France have not increased the number of nuclear warheads (no quantitative increase), but both countries are modernizing their nuclear warheads and delivery platforms (qualitative increase). The UK also does not show signs of increased nuclear warheads. But upgrades of delivery platforms are ongoing in the UK. Most significantly, the UK has decided to increase the cap on nuclear warheads. The P5 states have also remained distant from adopting NFU. Although

1) Ernest J. Moniz & Sam Nunn, "The Return of Doomsday," *Foreign Affairs*, 2019.; Benjamin Zala, "How the Next Nuclear Arms Race Will be Different from the Last One," *Bulletin of the Atomic Scientists*, Vol. 75, No. 1, pp. 36-43.; David A. Cooper, *Arms Control for the Third Nuclear Age: Between Disarmament and Armageddon* (Washington, DC: Georgetown University Press, 2021).

China maintains NFU as its official policy, the exponential growth in investments and build-up of nuclear weapons and silos draw suspicions about its commitment. These changes imply that the aggravating security environment (realists' concerns), weakening of collective commitment and benefits in nonproliferation regimes (institutionalists' interests), and strengthened norm/reappreciation of flexible and modern nuclear arsenal (constructivists) are accumulating into the P5s' recent nuclear pursuits that do not necessarily advance what NPT strives for.

As briefly outlined, this article begins with a review of NPT literature that discusses P5s' nuclear aspirations and their impact on the NPT. While pointing out the lack of empirical analysis on the P5s' nuclear policy, arsenal, and posture, the article proposes an analytic framework to assess changes in nuclear policy, capabilities, and readiness of the arsenals in the P5s. Second, based on the framework, the article analyzes the three variables concerning Russia, the US, and China – the P3 nuclear states in Asia. Third, this study looks into the cases of France and the UK. Finally, this article concludes what these changes mean on the NPT and ways forward.

Debating and Measuring P5s' Nuclear Aspirations and Impact on the NPT

Polarization by the P5s?

NPT has long been described as having a “midlife crisis.”²⁾ One of the major explanations has pointed to the growing polarization between the nuclear and non-nuclear member states. Former assistant director of the US Arms Control and Disarmament Agency, Lewis Dunn, for instance, observed that the “polarization among NPT parties is greater today than it ever has been.”³⁾ While non-nuclear weapon states on one side continue to call for the complete dismantlement of nuclear weapons, the P5s and others are in pursuit for nuclear modernization.⁴⁾ At the foundation of such polarization, many argue that because the NPT could not have been possible without the nuclear weapon states' “concessions” on nuclear disarmament,⁵⁾ the continued failures in taking positive steps toward the disarmament cannot but be deemed insufficient from the perspective of non-nuclear weapon states.

2) Peter Pella, *The Midlife Crisis of the Nuclear Nonproliferation Treaty* (San Rafael, CA: IOP Concise Physics, 2016).

3) L. A. Dunn, “The Strategic Elimination of Nuclear Weapons: An Alternative Global Agenda for Nuclear Disarmament,” *The Nonproliferation Review*, Vol. 24, No. 5-6(2017), p. 408.

4) Manseok Lee & Michael Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” *Strategic Studies Quarterly*, Vol. 14, No. 3(2020), pp. 111-112.

5) Harald Mueller, “The Nuclear Non-Proliferation Treaty in Jeopardy? Internal Divisions and the Impact of World Politics,” *The International Spectator*, Vol. 52, No. 1(2017), p. 15.

Indeed, when the NPT first entered into force in 1970(signed in 1968), the NPT mandated a Review and Extension Conference after twenty-five years. When the NPT members convened for a review conference in 1995, they agreed to make the NPT permanent on the condition that the members would also come down to an agreement on a comprehensive test ban on nuclear weapons – the Comprehensive Test Ban Treaty (CTBT). As Thomas Graham put it, the CTBT became like an “essential glue that held the NPT together.”⁶⁾ In other words, the belief and anticipation that the nuclear weapon states would make progress in reducing their nuclear arsenal and also stop nuclear testing and production, the non-nuclear weapon states upheld their commitments in NPT. Although the CTBT was signed as scheduled at the United Nations in 1996, nuclear weapon states have not ratified the CTBT. The US, faced with strong opposition at home, failed to ratify the CTBT in 1999 and remains without ratification until now.⁷⁾

Put differently, a growing literature holds the P5s responsible for the sustainability of the NPT. Harald Mueller emphasizes how the increasing great powers’ competition and nationalist policies on nuclear make the NPT ever more brittle.⁸⁾ Jeffrey Knopf also observes that there are “troubling signs of erosion across all aspects of the nuclear order” as the P5s and more states are in concert for more nuclear pursuits than restraints.⁹⁾ As typical examples, many draw attention to how the US, France, and UK’s – the three of the P5 nuclear weapon states – have consistently voted against UN General Assembly’s “Convention on the Prohibition of the Use of Nuclear Weapons,” which stated that “any use of nuclear weapons would be a violation of the UN charter and a crime against humanity.” The P5s’ joint statement against the Treaty on the Prohibition of Nuclear Weapons(TPNW) is another example,¹⁰⁾ which was released after the General Assembly’s approval of the treaty in 2018.

This article does not seek to dispute the view but to provide a more in-depth analysis of what extent the P5s’ nuclear pursuit or restraint has changed recently. More precisely, to analyze the P5s’ impact on the waning of the NPT, a comprehensive review is required that takes into account not only the P5s’ behaviors and decisions within the non-proliferation regimes, but actual changes in their nuclear strategy, capabilities, and operation of the forces.

6) Thomas Graham, “The Nuclear Non-Proliferation Treaty: Delayed Review – Issues Old and New,” *Journal for Peace and Nuclear Disarmament*, Vol. 4, No. 1(2021), pp. 186-195.

7) *Ibid.*, p. 188.

8) Harald Mueller, “The Nuclear Non-Proliferation Treaty in Jeopardy? Internal Divisions and the Impact of World Politics,” *The International Spectator*, Vol. 52, No. 1(2017), pp. 12-27.

9) Jeffrey Knopf, “Not by NPT Alone: The Future of the Global Nuclear Order,” *Contemporary Security Policy*(2021), Online publication, p. 1.

10) Jamie Kwong, “Rescuing a Fraying Nuclear Nonproliferation Regime,” *Carnegie Endowment for International Peace*, Jan. 13, 2022.; CSIS, “Bad Idea: Ignoring the Treaty on the Prohibition of Nuclear Weapons,” Dec. 6, 2018.

Manseok Lee and Michael Nacht, for instance, categorized states' behaviors under the NPT along two axis – NPT membership(Yes or No) versus nonproliferation(Yes or No)<Table 1>.11) If a state is an NPT member and does not proliferate, it is in “Full Compliance.” If a state is an NPT member but proliferates, it is “Cheating.” If a state is not an NPT member but does not proliferate, it pursues a policy of “nonmembership.” Lastly, if a state is not an NPT member and seeks proliferation, it is fully nuclear aspirant(full non-compliance). Yet, the article focuses on explaining ‘why’ a state would choose these policy options. The actual choices and behaviors of the P5s, for instance, are absent as the article concentrates on explaining the rationale, pros and cons of each choice, and how these choices could negatively impact the effectiveness of the NPT. In addition, Lee & Nacht’s ‘Yes or No’ framework excludes mid-way behaviors. A nonproliferating NPT member state, for instance, can be deemed to be in full compliance with the NPT, regardless of its gradual change towards offensive nuclear doctrine.

<Table 1> Lee & Nacht (2020) Framework for State Behaviors under the NPT

Lee & Nacht’s Framework		NPT Membership	
		Yes	No
Nonproliferation	Yes	Full Compliance	Nonmembership/Proliferation
	No	Cheating	Nonmembership/Proliferation

Source: Lee & Nacht’s framework (Table 1) reproduced, p. 101.

Measuring the P5s’ Nuclear Restraints

Against this backdrop, to gauge the P5s’ nuclear pursuit and/or restraints, this article proposes to modify and apply Lee & Nacht’s framework in three ways. First, the NPT membership axis is unnecessary as all P5s are NPT member states and are recognized nuclear weapon states under the NPT.

Second, to better account for mid-way behaviors that are less captured in Lee & Nacht’s framework, I propose to operationalize Lee & Nacht’s nonproliferation-axis into three variables: nuclear doctrine, nuclear capabilities, and nuclear readiness (posture, nuclear command, and control issues), as in the following <Table 2>. Here, I am bridging to the literature on the new nuclear arms race,¹²⁾ which gauges states’ intentions and actions along these variables:

11) Lee & Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” p. 101.

12) Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (St. Martin’s Griffin, 2013).; Moniz & Nunn, “The Return of Doomsday.”; Zala, “How the Next Nuclear Arms Race Will be Different from the Last One.”; Cooper, *Arms Control for the Third Nuclear Age*

- (1) Nuclear doctrine: What is the purpose/role of nuclear weapons? Is nuclear strategy more nuclear expansive/offensive vs. nuclear restraint/defensive? What is the position on the No-First-Use (NFU) policy – declaration to not use nuclear weapons first, has it changed?¹³⁾
- (2) Nuclear capabilities: What are the qualitative and quantitative changes in nuclear weapons (nuclear warheads and delivery platforms)? Although experts may draw different conclusions, they converge in evaluating the quality and quantity of nuclear forces.¹⁴⁾ The distinction is made whether the increase – in both quantity and quality – is made in nuclear warheads and/or delivery systems of these warheads. Thomas J. Christensen, for instance, in observation of Chinese nuclear modernization, argues that the underlying intentions are found less in China's continued NFU policy but in its efforts to enhance the survivability of the weapons by introducing new delivery platforms and solid-fuel missiles.¹⁵⁾
- (3) Nuclear readiness: What is the nuclear posture or readiness of the weapons system? How many are operational vs. in storage? How many are ready for launch-on-warning? What is the command and control system/structure of the nuclear arsenal? About Chinese nuclear posture, Jeffrey G. Lewis argues that it is important to distinguish how China maintains “the smallest operationally deployed nuclear force of any of the legally recognized nuclear weapon states” and “operates under a no-first-use pledge, and keeps its warheads off alert.”¹⁶⁾

Third, to visualize the extent of decrease and increase in P5s' nuclear pursuit, however arbitrary, I propose to allocate points as the following <Table 2>. Placing nuclear doctrine on one axis and capabilities and readiness on the other axis, a state pursuing offensive nuclear doctrine with an increase in the quantity, quality, and readiness of nuclear warheads and/or delivery platforms will be given a total of four points. A state that pursues defensive nuclear doctrine but shows the same increases as above will accumulate to two points. If a state pursues offensive nuclear doctrine but shows a decrease in the quantity, quality, and readiness of

13) Elbridge Colby, “Russia's Evolving Nuclear Doctrine and its Implications,” *FRS* (2016).; Baohui Zhang, “The Taiwan Strait and the Future of China's No-First-Use Nuclear Policy,” *Comparative Strategy*, Vol. 27, No. 2(2016), pp. 164-182.; David S. Yost, “France's New Nuclear Doctrine,” *International Affairs*, Vol. 82, No. 4(2006), pp. 701-721.

14) Gregory Kulacki, “China's Nuclear Force: Modernizing from Behind,” *Union of Concerned Scientists*, January 2018.

15) Thoma J. Christensen, “The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations,” *Journal of Strategic Studies*, Vol. 35, No. 4(2012), pp. 447-487.

16) Jeffrey G. Lewis, “Chinese Nuclear Posture and Force Modernization,” *The Nonproliferation Review*, Vol. 16, No. 2(2009), p. 197.

nuclear warheads, two points will be given. If a state pursues a defensive nuclear doctrine and shows a decrease or no change in the others, no points will be given. In sum, P5s will be depicted along a scale of zero to four – namely a spectrum of NPT Full Compliance (zero), NPT Constrained (two points), to NPT Challenging (four points).

<Table 2> Gauging P5s' Nuclear Pursuit

P5s' Nuclear Pursuit		Capabilities (Quality and/or Quantity)		Readiness (Quality and/or Quantity)	
		Increase	Decrease	Increase	Decrease
Nuclear Doctrine	Offensive	2	1	2	1
	Defensive	1	0	1	0

P3 in Asia, Nuclear Modernizations under the NPT

Russia: Seeking Qualitative Upgrades and New Delivery Systems

Russia's current nuclear policy traces back to its nuclear doctrinal shift in the early 1990s, when Russia abandoned its earlier NFU pledge of 1982 in the newly announced nuclear doctrine in November 1993. After about twenty-seven years, Russia appears to be taking another offensive turn as evident in the newly signed executive decree in 2020 – ‘The Basic Principles of the Russian Federation’s State Policy in the Domain of Nuclear Deterrence.’¹⁷⁾ In addition to reconfirming that Russia does not rule out its nuclear first-use,¹⁸⁾ the new policy further specified four conditions for nuclear use: (1) the launch of ballistic missiles “attacking the territory of the Russian Federation and/or its allies,” (2) other uses of weapons of mass destruction, (3) “attack by adversary against critical governmental or military sites of the Russian Federation, disruption of which would undermine nuclear forces’ response actions,” as well as (4) “aggression against the Russian Federation with the use of conventional weapons when the very existence of the state is in jeopardy.”¹⁹⁾ Although Russia maintains that nuclear weapons are “exclusive” means for deterrence, Russia’s annexation of Crimea in 2014 with threat of tactical nukes, invasion of Ukraine in 2022, and latest Putin’s declaration

17) V. Isachenkov, “Putin Signs Russia’s Nuclear Deterrent Policy,” *Associated Press*, Jun. 2, 2020.

18) As emphasized in Russia’s military doctrine from 2000, Russia has continued to declare the possibility of nuclear use in response to conventional aggression that is “critical to the national security of Russia.”

19) O. Oliker, “New Document Consolidates Russia’s New Nuclear Policy in One Place,” *Russia Matters*, Jun. 4, 2020.

to suspend the New START treaty on February 21, 2023, suggest that Russia's nuclear doctrine is under change.

Transition in Russia's nuclear doctrine is evident from closer observation of the changes concerning Russia's nuclear arsenal from 2018 to 2022. In numerical terms, while the total number of nuclear warheads decreased, the fall came from dismantling the retired warheads that remained in the inventory. If we look at the number of deployed warheads during 2020 and 2022, the numbers of land-based and submarine-launched ballistic missiles, in fact, increased from 810 to 812 and 560 to 576, respectively. The total operational warheads (excluding retired warheads) showed a slight decrease from 4,350 nuclear warheads in 2018 to 4,310 in 2020, but again increased beyond 2018-level to a total of 4,477 in 2022 <Table 3>. According to Chief of the General Staff Valery Gerasimov, as of December 2021, Russia has allegedly ninety-five percent of Russia's strategic missile forces "continuously ready for combat use."²⁰ In addition, many have anticipated that Russia will substantially increase the number of its deployed nuclear weapons should the New START treaty expire in 2026, which worked to place a cap on both US and Russia's strategic nuclear arsenal.²¹ As Putin suspended the New START in response to Biden's visit to Ukraine, we can expect Russia's increase in the nuclear arsenal (e.g., by deploying more warheads from storage and production of new).

<Table 3> Russia's Nuclear Arsenal: 2018-2022

Year	Operational Total	Deployed			Storage		Retired	Total
		Ballistic Missile	Bomber	Nonstrategic	Strategic	Nonstrategic		
2022	4,477	1,388 (land-based : 812, SLBM: 576)	200		977	1,912	1,500	5,977
2020	4,310	1,370 (land-based : 810, SLBM: 560)	200		870	1,870	2,060	6,370
2018	4,350	1,600			920	1,830	2,500	6,850

Source: Hans M. Kristensen & Matt Korda, "Russian Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 3(2018), pp. 185-195.; "Russian Nuclear Forces, 2020," *Bulletin of the Atomic Scientists*, Vol. 76, No. 2(2020), pp. 102-117.; "Russian Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 2(2022), pp. 98-121.

²⁰ RIA Novosti, "В Генштабе Рассказали О Готовности Установок Для Ядерных Ракет К Пуска," Dec. 9, 2021.

The increases in Russia's nuclear arsenal also become more prominent if we look into Russia's decade-long pursuit for upgrades in its nuclear arsenal. Most notable is Russia's development of new delivery systems. Russia is modernizing its ICBMs, conducting more than twenty-five ICBM tests in the last five years, including at least ten planned in 2022, which is an evident increase in the frequency of the tests.²²⁾ The testings include Russia's development of the new heavy Sarmat ICBM, which once completed will become the heaviest and longest ICBM of all nuclear powers. The ICBM modernizations also accompany the development of new testing sites and the modernization of the facilities. Russia, for instance, announced in 2020 that it was developing a new testing site for Sarmat tests at Severo-Yeniseysky.²³⁾ Russia is also upgrading and hardening the silos and other support facilities by modifying the external fences, roads, and other infrastructure of the silos, including the installation of "Dym-2" perimeter defense system with "automated launchers, small arms fire, and remote-controlled machine gun installations."²⁴⁾

In addition to missiles, Russia has already deployed the Avangard hypersonic glide vehicle, capable of carrying both conventional and nuclear warheads at a speed of Mach 20-27, with the ability to evade missile defense systems. According to Hans M. Kristensen and Matt Korda, Russia has deployed two per year, beginning with the first two on December 27, 2019,²⁵⁾ another two in December 2020,²⁶⁾ and the final two in December 2021, completing a total of six. Further notable is Russia's development of Poseidon, a nuclear-powered long-range underwater drone, previously known as codename Status-6, which enables Russia's use of a "dirty bomb" and "wide radio-active contamination."²⁷⁾ Burevestnik (NATO's designation: SSC-X-9 Skyfall) nuclear-powered and -armed cruise missile is also discussed, although not much progress is revealed. According

21) Lydia Wachs, "The Role of Nuclear Weapons in Russia's Strategic Deterrence, *Stiftung Wissenschaft und Politik*, Nov. 25, 2022.

22) Krasnaya Zvezda, "Ракетные Войска Стратегического Назначения – Основная Составляющая Стратегических Ядерных Сил России," Dec. 17, 2021.

23) Russian Federation, "Expanded Meeting of the Defence Ministry Board," Dec. 21, 2020.

24) Russia Insight, "Breaking! Russia's New Top Secret "Toy" Revealed: "Dym" Small Arms System Protects RS-24 Yars ICBMs," Dec. 21, 2018.

25) Hans M. Kristensen & Matt Korda, "Russian Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 2(2022), pp. 98-121.

26) TASS, "The First Avangard Missile Regiment Took up Combat Duty," Dec. 27, 2019.; Russian Federation Defense Ministry, "Chief of the General Staff of the Russian Armed Forces-First Deputy Minister of Defence General of the Army Valery Gerasimov Meets with Representatives of the Military Diplomatic Corps Accredited in Russia," *Press Release*, Dec. 18, 2019.

27) P. Podvig, "Is Russia Working on a Massive Dirty Bomb," *Russian Strategic Nuclear Forces*, Nov. 10, 2015.

to President Putin's end-of-year statement in 2020, Russia has completed 88.3 percent of the modernization of its nuclear triads.²⁸⁾

The readiness of Russia's nuclear arsenal can be assessed by its nuclear command, control, and communication system(NC3). Given President's sole authority in deciding nuclear use – for both strategic and nonstrategic nuclear weapons – according to Russia's nuclear doctrine, it is assumed that the President carries a 'nuclear briefcase,' so-called 'Cheget' at all times, which is the communication system that links the President with his top-ranking aides and to rocket force commanders at the site for a nuclear launch. The "Kazbek" command and control network enables the transmission of top secrets involving nuclear use. According to Russia's Zvezda television, the Cheget is composed of an "array of buttons." In the "command" section, there is allegedly a white 'launch' button and a red 'cancel' button. And the buttons are activated by a special flashcard. Should the President determine that a threat is imminent and decides to use nuclear weapons, the President will send direct launch order to general staff command and reserve command units. The units will then immediately transmit the order to strategic rocket force units, which then would make the final launch of the weapons. The readiness varies along the duration of final decision-making and just a few minutes to transmit the final order down the chain of command and communication.

US: Pacing Change for Nuclear Revival and Modernization

Since the Trump Administration, the US's nuclear doctrine and forces have also shown a pacing change with a renewed emphasis on nuclear modernization. While the Obama Administration began with a pledge to take "concrete steps toward a world without nuclear weapons" at the nuclear security summit in Hague in 2009, Russia's annexation of Crimea with the threat of nuclear use in 2014 quickly revived the US's interest in the role of nuclear weapons. The US also continues not to rule out the first use of nuclear weapons as seen in the 2022 nuclear posture review (NPR), although the Obama Administration in 2016 and the Biden Administration in 2021 have considered adopting the NFU policy.²⁹⁾

A more specific yardstick to gauge changes in the US's nuclear doctrine is the subtle changes in its policy of calculated ambiguity. With the underlying rationale that clarity in nuclear strategy can enable adversarial countries to take advantage, escalate, or cause unwanted entrapments, the US's longtime nuclear policy has rested on not specifying what it will do and will not do. However, if we look at Chapter IV on tailored nuclear deterrence strategies in the latest NPR, changes are

28) Russian Federation, "Expanded Meeting of the Defence Ministry Board," Dec. 21, 2020.

29) The Wall Street Journal, "'No First Use' Nuclear Policy Proposal Assailed by U.S. Cabinet Officials, Allies," Aug. 12, 2016.

quite apparent. Shifting from US's pledge to use "all means necessary, including nuclear weapons, to defend allies in Europe and Asia," despite allies' reiterated requests to specify when, how, and what means will be provided in case of under attack, this time, the NPR specifically listed names of new tactical nuclear weapons to be directed against China and Russia in the chapter. To both China and Russia, the NPR declared that the US would deter attacks and nuclear coercion by adding the SLBMs tipped with new low-yield W76-2 nuclear warheads. Also, as Russia threatens to use its tactical nukes against Ukraine and any Western intervention in the ongoing Russia-Ukraine War, the NPR stated that the US will provide a combination of strategic and non-strategic nuclear forces, including the new B61-12 new nuclear gravity bomb that began its development since Trump administration. The US's declaratory policy manifests heightened appreciation and weight on the role of nuclear weapons in the US's strategy, which is a contrast to how the US aimed to reduce the apparent role of nuclear weapons in the US's strategy since the end of the Cold War.

The US's nuclear doctrine may not be regarded as expansive and/or aggressive, but its declaratory policy is less of the restraint from the previous in relative terms. The change is more palpable when we observe US's nuclear arsenal. Away from emphasis on the pursuit for world free of nuclear weapons, the Trump administration's 2018 NPR reaffirmed the "bedrock truth" that nuclear weapons are critical in "detering nuclear attack and in preventing large-scale conventional warfare between nuclear-armed states for the foreseeable future."³⁰ With emphasis on nuclear modernization and maintenance of robust nuclear triad, the 2018 NPR also announced plan to acquire three new low-yield nuclear weapons: 1) B61-12 nuclear gravity bomb: to modernize tactical nuclear forces stationed in Europe in defense against Russia's growing threats, the US began development of B61-12 nuclear gravity bomb to replace the old B61-3 and B61-4 produced in 1979; 2) W76-2 tipped SLBM: developing a new eight kiloton low-yield warhead(W76-2), to be tipped on the Trident-II SLBMs; 3) new nuclear cruise missile(SLCM-N) by tipping new low-yield warhead on Tomahawks.³¹ While the incumbent Biden administration canceled the SLCM-N, W76-2 are already deployed and operational since December, 2019, and B61-12 are to be completed for production by 2024. While the development of the new arsenal did not involve nuclear tests (subcritical tests) and thus no breach of the NPT, which bans nuclear tests for any military purposes, the US has acquired new and modern types of nuclear weapons that provide more accuracy and smaller yield. What this may also suggest is the increased flexibility and lowered threshold in the use of the weapons, as the surgical nuclear strike has become a new viable option.³²

30) US Department of Defense, "2018 Nuclear Posture Review"(2018), pp. iii.

31) Ibid., pp. xi-xii.

32) Nina Tannenwald, "The Nuclear Taboo: The United States and the Normative Basis of

If we look more precisely at the US's nuclear arsenal in absolute numbers, it is in decline. From 2018 to 2022, the total number of nuclear warheads – deployed, in storage, and retired – decreased all-around, as shown in <Table 4>. However, what must be noted is the increase in the number of strategic nuclear warheads from 2020 to 2022. Although the nonstrategic, tactical nukes deployed in Europe declined from 150 warheads to 100 by 2022, the nuclear warheads on ballistic missiles increased from 1,300 in 2020 to 1,344 in 2022. Of the forty-four newly deployed warheads, twenty-five are the new W76-2 low-yield nuclear warheads that became operational in December 2019. The rest of the nuclear warheads are speculated to be deployed from stockpiles in storage, which suggests enhanced readiness of the weapons system.

<Table 4> US's Nuclear Arsenal: 2018-2022

Year	Operational Total	Deployed			Storage		Retired	Total
		Ballistic Missile	Bomber	Nonstrategic	Strategic	Nonstrategic		
2022	3,708	1,344	300	100	1,964		1,720	5,428
2020	3,800	1,300	300	150	2,050		2,000	5,800
2018	4,000	1,650		150	2,200		2,550	6,550

Source: Hans M. Kristensen & Matt Korda, "United States Nuclear Forces, 2020," *Bulletin of the Atomic Scientists*, Vol. 76, No. 1(2020), pp. 46-60.; "United States Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 3, pp. 162-184.; Hans M. Kristensen & Robert S. Norris, "United States Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 2, pp. 120-131.

The US nuclear bases in Europe are also more alert. According to Hans M. Kristensen of the Federation of American Scientists (FAS), the US has recently increased investment in modernizing facilities, including nuclear storage facilities at Lakenheath Air Base in the UK.³³ Lakenheath Base is known to have deployed approximately 110 B61-3/-4 tactical nuclear bombs in thirty-three underground facilities in the 1990s. Although it is unlikely that the US will permanently deploy the new B61-12 for strategic flexibility, the modernizations are expected to enable the relocation of the US's nuclear weapons in Europe in case of contingencies and complicate adversary's calculation by confusing the exact location of the weapons.

In terms of 'minutes,' the readiness of the US's nuclear arsenal is reported to

Nuclear Non-us," *International Organization*, Vol. 53, No. 3(1999), pp. 433-468.; Paul Nitze, "Is It Time to Junk Our Nukes? The New World Disorder Makes Them Obsolete," *The Washington Quarterly*, Vol. 20, No. 3(1994), pp. 97-101.

33) Hans M. Kristensen, "Lakenheath Air Base Added to Nuclear Weapons Storage Site Upgrades," *Strategic Security, Federation of American Scientists*(2022).; See US's NATO Security Investment Program (NSIP) under the FY2023 Defense Budget, Military Construction Program (April 2022).

be “two minutes” for land-based strategic nuclear arsenal – Minuteman-III ICBMs – and “fifteen minutes” for submarine-launched Trident-II SLBMs, from the final order delivered to the commander at the site to the final launch of the asset.³⁴⁾ The decision-making process may be immediate but more likely to require more time as the President requires deliberation along the chain of command and communication from Secretary of State and Defense, Joint Chiefs of Staff, and other high-ranking officials of the government. Once a decision is made, the President needs to authorize nuclear use via a communication system known as ‘nuclear football’ and transmit an authorization code to activate the weapons for launch.³⁵⁾

China: Gradual Nuclear Expansionist in Asia

China’s nuclear strategy maintains its traditional position that China will not use nuclear weapons first (NFU) and not against non-nuclear countries but maintain them for minimum deterrence and survivable second-strike purposes. While changes may not be evident from China’s official statements, the rapid build-up of China’s nuclear capabilities can be observed qualitatively and quantitatively in the increases in its nuclear warheads and new delivery platforms.

In numerical terms, China’s nuclear warheads almost doubled from a total of 280 in 2018 to 474 in 2022 including the warheads in storage <Table 5>. China is indeed the only P5 country wherein the total number of nuclear warheads – including the ones deployed, stored, and retired – increased. According to the US’s Annual Report to Congress, China is expected to have about “1,000 operational nuclear warheads” by 2030, “most of which will be fielded on systems capable of ranging the continental United States.”³⁶⁾ The report further projected that China may field about 1,500 nuclear warheads by 2035.³⁷⁾

34) CRS, “Defense Primer: Command and Control of Nuclear Forces,” Nov.19, 2021.

35) US Joint Chiefs of Staff, “Joint Publication 3-72: Nuclear Operations,” Jun. 11, 2019.

36) US Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2022*(Office of the Secretary of Defense, 2022), p. 97.

37) *Ibid.*, p. 94, 98.

<Table 5> China's Nuclear Arsenal:2018-2022

Year	Operational Total	Deployed			Storage	Total
		Land-based	Sea-based	Bombers (Gravity bombs)		
2022	410	318	72	20	64	474
2020	272	240	48	20	78	350
2018	254	120-130	48	(~20)	26	280

Source: Hans M. Kristensen & Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 4(2018), pp. 289-295.; Hans M. Kristensen & Matt Korda, "Nuclear Notebook: Chinese Nuclear Forces, 2021," *Bulletin of the Atomic Scientists*, Nov. 15, 2021.; Hans M. Kristensen, Matt Korda, & Eliana Reynolds, "Chinese Nuclear Weapons, 2023," *Bulletin of the Atomic Scientists*, Vol. 79, No. 2(2023), pp. 108-133.

China's recent developments also include the modernization of delivery platforms. From a limited number and mostly fixed, land-based ICBMs, China is now making their ICBMs more road-mobile and also seeking strategic sea- and air-based capabilities. At least at a 'nascent' stage of acquiring a nuclear triad, China is modernizing its Type-094 submarines with longer-range JL-3 SLBMs, developing air-launched ballistic missiles, and reassigning nuclear missions to its bombers. In addition, China is developing short-range and medium-range missiles with hypersonic glide vehicles.³⁸⁾ Meanwhile, China's possession of a tactical nuclear arsenal is unclear. Yet considering China's nuclear tests between 1965 and 1979 involving bombers and display of the nuclear bombs(models), Hans Kristensen and Matt Korda speculate that China is capable of developing bombs for the bombers.³⁹⁾

Another notable change is China's increasing number of silos. From only twenty silo-based ICBMs, China is reported to have recently built more than 250 new long-range missile silos at as many as three major locations in the northwestern region.⁴⁰⁾ Given the absence of China's official explanations, there are also growing speculations that China may be able to use fissile materials from civilian nuclear facilities to increase its nuclear warheads to be tipped on new delivery platforms and missiles.⁴¹⁾ According to the US Department of Defense, the readiness of China's nuclear arsenal may be also increased, possibly seeking

38) Hans M. Kristensen, Matt Korda, & Eliana Reynolds, "Chinese Nuclear Weapons, 2023," *Bulletin of the Atomic Scientists*, Vol. 79, No. 2(2023), pp. 108-133.

39) Hans M. Kristensen & Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 4(2018), p. 290.

40) Arms Control Association, "Pentagon Sees Faster Chinese Nuclear Expansion," 2021.

41) The Washington Post, "China is Building More than 100 New Missile Silos in its Western Desert, Analysts Say," Jun. 30, 2021.

“launch-on-warning... posture” with the enhanced silo-based ICBMs.⁴²⁾ For now, China is more likely to keep nuclear warheads separated from delivery platforms – missiles, launchers, and bombers – which would technically require some time to prepare nuclear weapons for launch.

France and UK, the P2s in Europe: Modernization within Constraints

France and UK are the two European nuclear powers that share many similarities. Most conspicuous is their pursuit of a minimum nuclear deterrent, voluntarily restricting to a small number of nuclear warheads and delivery platforms. Another notable similarity is France and the UK’s strict maintenance of ‘strategic ambiguity’ when it comes to when, how, and at what scale they would use nuclear weapons. Unlike the US’s disclosure of its nuclear strategy, arsenal, and modernization efforts, the two European nuclear powers remain relatively reticent to complicate the calculations of potential aggressors on the basis of a ‘smaller’ nuclear arsenal. Recently, with Russia’s renewed assertiveness in the region since the invasion of Crimea and Ukraine, there appears to be a common pursuit for nuclear modernization and heightened appreciation of nuclear arsenal both in France and the UK.

France: Modernization for Strict Sufficiency

In terms of nuclear doctrine, France proclaims to “limit” the role of nuclear weapons to “extreme circumstances of self-defence.”⁴³⁾ Yet, France also makes it clear that France retains the right to conduct “a unique and one-time-only” nuclear use in case of aggression, in order to demonstrate and deter further aggression by the adversary.⁴⁴⁾ As one of the P5 states to the NPT, France also pledged not to use nuclear weapons against nonnuclear states. France’s nuclear doctrine is also described along its policy of “strict sufficiency,” wherein France seeks possession of the lowest possible level of nuclear weapons compatible with changing strategic environment.⁴⁵⁾ President Macron in February 2020, for instance, emphasized that France has voluntarily “dismantled irreversibly its land-based nuclear component, its nuclear test facilities, its fissile material for weapons production facilities, and

42) US Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China* (2021).

43) Speech of the President of the Republic on the Defense and Deterrence Strategy, February 7, 2020.; Shannon Bugos, “France Offers Nuclear Deterrent to All Europe,” *Arms Control Association*, March 2020.

44) Ibid.

45) Ibid.

having reduced the size of its arsenal, which is currently under 300 nuclear weapons.”⁴⁶⁾ In contrast to US and Russia’s number of nuclear stockpiles and operation of nuclear triads(ICBM-SLBM-Bombers), voluntary restraint on the delivery platforms and the number of the nuclear arsenal are defined as France’s policy of strict sufficiency.

Accordingly, France has fewer than 300 operational nuclear warheads, around eighty percent of which are maritime-based, operated by the Navy’s total fleet of four Triomphant-class SSBNs. Each Triomphant-class SSBN operates up to sixteen M-51 and M-51.2 SLBMs. In total, the Navy maintains a total of forty-eight SLBMs.⁴⁷⁾ Full payload of M-51 is six warheads with variable yields, with a range of 6,000km, and can be extended to 8,000km when carrying a single warhead.⁴⁸⁾ Readiness of the SSBNs is “continuous at sea deterrent (CASD)” posture, operating at least one SSBN at sea, while the other three rotate along maintenance, training, and stand-by at the port. French Navy also operates ten Rafale MF3 aircraft (deployed on France’s Charles de Gaulle aircraft carrier) capable of carrying nuclear-tipped, medium-range(600km) ASMP-A cruise missiles. The rest twenty percent of nuclear warheads are operated by the French Air Force – two squadrons of around forty Rafale MF3 aircraft that are assigned with nuclear roles. The Rafales are also equipped with fifty-four nuclear-armed medium-range(600km) ASMP-A cruise missiles.⁴⁹⁾ France also maintains thirty tons of highly-enriched uranium(HEU) and six tons of plutonium.

Upon strict sufficiency, however, France has been on the lookout for changing security environment in the region. According to the 2017 Strategic Review, France observes how the international system is “giving way to a multipolar environment,” that is “subject to sweeping changes.”⁵⁰⁾ Particularly after Russia invaded Crimea, President Hollande noted how threats of “tactical nuclear arsenals are growing” in the European sphere.⁵¹⁾ Identifying Russia and China, as well as IS, North Korea, and Iran’s nuclear proliferation as threats in 2021 Strategic Update,⁵²⁾ France has reconfirmed the need for “two complementary”(air- and maritime) nuclear deterrent to address the growing challenges.⁵³⁾ There is a heightened appreciation of nuclear arsenal in France.⁵⁴⁾

46) Ibid.

47) Speech by M. Francois Hollande, President of the Republic, Feb. 19, 2015.

48) Bruno Tertrais, “Nuclear policy: France stands alone,” *Bulletin of the Atomic Scientists*, July/August (2004).

49) Claire Mills, “The French Nuclear Deterrent,” *House of Commons Briefing Paper*, No. 4079(2020), pp. 1-24.

50) Government of France, “Defence and National Security Strategic Review 2017”(2017), p. 16.

51) Speech by M. Francois Hollande, President of the Republic, Feb.25, 2015, p. 2.

52) Government of France, “Strategic Update”(2021), pp. 16-17.

53) Government of France, “Defence and National Security Strategic Review 2017”(2017), p. 51.

Against this backdrop, France's nuclear modernization, similar to other P4 nuclear states, has focused on modernizing their delivery platforms. Announcing plans to "renew" existing air- and maritime-based nuclear arsenal in the 2021 Strategic Update,⁵⁵⁾ France also pledged a nuclear modernization plan to invest thirty-seven billion Euros by 2025. In an explanation of the plan, defense minister Florence Parly stated that France aims to "make up for past shortfalls and build a modern, sustainable, protective army."⁵⁶⁾ France has commenced research on possible replacement and upgrades of the Triomphant-class SSBNs, combat aircraft, and new generation of SLBM (M-51.3 SLBM) and air-launched cruise missiles. Namely, France's Triomphant-class SSBNs entered service in 1997. Considering the expected service life of thirty-five years, France has launched third generation SSBN program, designated as 'SNLE 3G.' The first batch is expected to be in service in the early 2030s.⁵⁷⁾

While France reiterates its nuclear restraint for withdrawing ground-based ballistic missile force in 1996, analysts point out that submarines are the most survivable (hard to detect) and advanced delivery platforms, with which air-based delivery systems provide France with both strategic and tactical nuclear capabilities. With airborne capabilities utilized for precision targeting and M-51 SLBM for long-range missions, France retains complementary systems that provide a "range of necessary and sufficient options."⁵⁸⁾

Also, France has been modernizing their nuclear warheads. A new and more robust 'Tête Nucléaire Oceanique (TNO),' which reportedly has a maximum range of 9,000km, is now carried by new M-51.2 SLBMs.⁵⁹⁾ Modernizations of France's ASMP-A cruise missiles involve refurbishing, which began in 2016, and also tipping with new 'Tête Nucléaire AeroPortée(TNA)' – the air-launched version of the new TNO. The specific yield of TNA is unknown. France has also begun research for the fourth generation of missile, designated as the 'ASN4G (air-to-surface nuclear fourth generation).' Advancing the stealth and maneuver of the missile, ASN4G will replace the ASMP-A in 2035.⁶⁰⁾ In short, with new warheads, France pursues a flexible nuclear posture on both air- and sea-based

54) The 2021 Strategic Update, for instance, in confirming how the 2017 evaluations have been "proven," emphasized that France's "nuclear and conventional forces support each other at all times." Government of France, "Strategic Update"(2021), p. 27.

55) Ibid., p.29.

56) EURACTIV, "France to Spend €37 Billion Euros on Upgrading Nuclear Arsenal," Feb. 9, 2018.

57) Naval News, "France Launches Third Generation SSBN Program," Feb. 21, 2021.

58) Speech by M. Francois Hollande, President of the Republic, Feb. 19, 2015.

59) Bruno Tertrais, *French Nuclear Deterrence Policy, Forces, And Future: A Handbook* (Paris: Fondation pour la recherche stratégique, 2020).

60) Claire Mills, "The French Nuclear Deterrent."

delivery platforms.

The readiness of France's nuclear arsenal resembles the US, wherein the President maintains the sole authority for nuclear use. The specific plans and scenarios for nuclear use are prepared by Special Planning Authority and reviewed by Defense Minister. Yet, the President makes the ultimate decision.⁶¹⁾ Similar to the US's PAL system, France's nuclear arsenals are equipped with a control system that requires an authorization code to be activated. For the actual release of the weapons, France adopts the 'two-person rule,' requiring final consent from two commanders at the final chain of the order. For example, SLBM launch from strategic submarines requires consent from both the commander and the deputy commander.⁶²⁾

UK: Continued Modernization of Single Sea-based Deterrent

Minimum deterrence and "deliberate ambiguity" are at the heart of the UK's nuclear policy. Limiting its nuclear use to "only in extreme circumstances of self-defence, including the defense of NATO allies"⁶³⁾ – the UK emphasizes its policy to remain "deliberately ambiguous about precisely when, how and at what scale [UK] would contemplate the use of nuclear weapons."⁶⁴⁾ UK also maintains the position that UK's nuclear arsenal "do not target" any specific state.⁶⁵⁾ Deliberate ambiguity aims to secure deterrence and strategic stability in times of changing security environment.

Despite UK's emphasis on minimum deterrence and deliberate ambiguity, the changing threat environment and perception are also driving UK's push for nuclear modernization. For instance, veering away from 2010's pledge to reduce its nuclear stockpiles by sixty-five percent by 2020 – below 180 nuclear weapons⁶⁶⁾ – the 2021 Integrated Review concluded that the pledge can no longer be fulfilled given the changing security environment. UK's conservative government announced on March 16, 2021, that it would change the '180-threshold' and keep its nuclear arsenal at '260 and/or below.'⁶⁷⁾ As of 2021, the UK possesses 195

61) Bruno Tertrais, *La France et la dissuasion nucléaire: concept, moyens, avenir.*(Paris: Doc Française, 2017), p. 152.

62) Shaun Gregory, "French Nuclear Command and Control," *Defense Analysis*, Vol. 6, No. 1(1990), p. 50.; Bruno Tertrais & Jeffrey Lewis, "The Finger on the Butter: The Authority to Use Nuclear Weapons in Nuclear-armed States," *CNS Occasional Paper*, No. 45(2019), p. 17.; Niklas Granholm & John Rydqvist. *Nuclear Weapons in Europe: British and French Deterrence Forces*(FOI, 2018), pp. 56-57.

63) UK HM Government, *Global Britain in a Competitive Age: The Integrated Review of Security Defence, Development and Foreign Policy*(2021).

64) *Ibid.*, p. 77.

65) *Ibid.*, p. 76.

66) "...this is no longer possible" in *Ibid.*

nuclear warheads, which are developed and produced at the Atomic Weapons Establishment(AWE).⁶⁸⁾ While the exact yield of the warheads remains in a veil, it is anticipated that the UK operates a maximum of 100kt-yield Mk4 nuclear warheads.⁶⁹⁾ In February 2020, UK announced development for next-generation nuclear warheads to replace the Mk4s.

What distinguishes the UK from other P5 states is its operation of a “single deterrent system” – the sea-based delivery platform – the Royal Navy’s Vanguard-class submarines – as the only delivery system for their nuclear warheads.⁷⁰⁾ Keeping CASD posture (also termed as Operation Relentless), similar to France, UK operates four Vanguard-class submarines, wherein at least one nuclear-armed submarine patrols the sea at all times.⁷¹⁾ Each Vanguard-class carries a maximum of sixteen US-produced Trident-II SLBMs, which can be tipped with a maximum of three nuclear warheads (UK operates a total of fifty-eight Trident-II SLBMs).⁷²⁾ In total, each Vanguard-class submarine can operate up to forty-eight nuclear warheads. Normally, each submarine is reported to carry a maximum of forty nuclear warheads, as other SLBMs are equipped with decoys and warheads with smaller yields.⁷³⁾ As the Vanguard-class submarines entered service in the 1990s, nearing the end of service life, the next-generation program for Dreadnought-class submarines have been underway. Four Dreadnought-class submarines will be built and enter service in the early 2030s.

The readiness of the UK’s nuclear arsenal is kept approximately an hour from the Prime Minister’s order of the launch to the firing of the missile. Similar to France, UK’s nuclear arsenal remains independent of its US and European allies. Prime Minister maintains the sole authority to use nuclear weapons even in case of allied responses. Prime Minister’s decision to use nuclear weapons triggers the ‘National Firing Directive,’ which will be transmitted to the Nuclear Operations Targeting Center (NOTC) that is located adjacent to the UK’s Defence Crisis Management Centre (PINDAR) at the Ministry of Defence. The order is also transmitted to the Permanent Joint Headquarters (PJHQ), which will relay the order to the ‘Commander of Task Force 345(CTF-345),’ who will transmit the

67) IPFM, “Countries: United Kingdom,” Aug. 31, 2021.

68) UK Parliament, “Nuclear Weapons at a Glance: United Kingdom,” Mar. 22, 2021.

69) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 23.

70) UK Parliament, “Nuclear Weapons at a Glance.”

71) UK Ministry of Defence, “UK’s Nuclear Deterrent(CASD),” Mar. 16, 2021.

72) UK Parliament, “Nuclear Weapons at a Glance.”; Moreover, it is important to note that the Trident-II SLBMs are produced and maintained by the US. While the nuclear warheads and submarines are indigenously manufactured, the operation of the SLBM is administered by the US. For example, every operation includes a port visit to the US for maintenance of the Trident-II SLBMs.

73) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 21.

final order to the submarine at sea to launch the SLBM. From Prime Minister, NOTC, CTF-345, to the submarine at sea is reported to take about forty minutes. For the nuclear submarine to confirm the order, authorize, and prepare for final launch would take about fifteen minutes.⁷⁴⁾

Conclusion

All in all, the proposed framework <Table 6> may not fully capture P5s' nuclear pursuits. Debate remains on whether we can still interpret China's nuclear policy as 'defensive' given China's unprecedented build-up of its nuclear arsenal. Questions can be also raised about whether both qualitative and quantitative increases in China's nuclear arsenals can be treated as equivalent to P4's modernization of nuclear warheads and delivery platforms when the actual stockpile of nuclear warheads decreased in these countries. The US's production of new nuclear warheads and France's upgrade of nuclear warheads are contextually different. Nonetheless, based on the framework shown in <Table 6> that assesses the P5's nuclear pursuit along a scale, however arbitrary it may be, this paper concludes that Russia accumulates to four points as an NPT-challenging state and other P4 are given two points as NPT-constrained states. None of the P5 states fully complies with the NPT (zero point).

<Table 6> P5s' Nuclear Pursuit in Spectrum

P5s' Nuclear Pursuit		Capabilities (Quality and/or Quantity)		Readiness (Quality and/or Quantity)		Conclusion
		Increase	Decrease	Increase	Decrease	
Nuclear Doctrine	Offensive	2 (RUS)	1	2 (RUS)	1	NPT Challenging (Total: 4pts) RUS
	Defensive	1 (US, UK, FRA, CHI)	0	1 (US, UK, FRA, CHI)	0	NPT Constrained (Total: 2pts) US, UK, FRA, CHI

While this study recognizes the inherent limitations of the framework, as an attempt to empirically analyze P5s' changing nuclear strategy and policy, I find its results still meaningful. The results manifest how the emphasis on nuclear modernization and (re-)appreciation of nuclear capabilities have been heightened among all the P5s. Given the difficulties to "achieve at the earliest possible date the

74) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 18.

cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament” as described in the preamble of the NPT, we have observed Russia’s and China’s rapid build-up of the nuclear arsenal and US and France’s upgrades of the weapons with new warheads and delivery platforms, as well as UK’s announcement of a higher threshold for the nuclear stockpile. The P5 states have also remained distant from adopting NFU. Although China maintains NFU as its official policy, the exponential growth in investments and build-up of nuclear weapons and silos draw suspicions about its commitment.

Then, what are the implications of these changes by P5s? If we go back to the theoretical debates on what held the NPT together, the realist approach has perceived the NPT as an outcome of the power politics of the P5 nuclear weapon states. As the rational, power-driven nuclear powers at the beginning of the Cold War, the P5s feared the emergence of new nuclear states. With materialist interests in mind, to “maintain their nuclear oligopoly and preeminence,”⁷⁵⁾ the P5s “colluded” to the creation of NPT.⁷⁶⁾ The non-nuclear powers would also be interested in joining the NPT as a means for alliances and balancing against their threats. The institutionalist approach interpreted that because NPT enables solutions to the problem of collective action, states are urged to join and uphold their commitments. Sharing realists’ assumptions that states are self-interested and rational actors, the benefits of information sharing, checks and balances, and an overall reduction in transaction costs would enable voluntary cooperation from the states. From the constructivist perspective, the NPT has been upheld thanks to the norms and values of nuclear non-proliferation. As states become more aware of the values of being responsible actors in the international community through the process of international socialization, the NPT incentivizes the states to comply with non-proliferation norms. The immaterial fears of nuclear weapons, justice, and other emotional factors also influence why more states have joined the NPT over the past years.⁷⁷⁾ In this theoretical backdrop, it seems the aggravating security environment (realists’ concerns), weakening of collective commitment and benefits (institutionalists’ interests), and strengthened norms/reappreciation of flexible and modern nuclear arsenal (constructivists) are accumulating to the P5s’ recent behaviors that do not necessarily advance what NPT strives for.

Yet, as we have seen in the case of France and the UK, the self-restraint of the nuclear powers is not all lost. The concerns for maintenance costs and escalations from keeping ‘too many’ nuclear arsenals have induced these countries to modernize their nuclear arsenal within past policy constraints. The major implication here is that polarizations within the NPT may get exacerbated if we exaggerate and do not

75) Lee & Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” p. 98.

76) A.J. Coe & J. Vaynman, “Collusion and the Nuclear Proliferation Regime,” *Journal of Politics*, Vol. 77, No. 4, pp. 983-997.

77) Mueller, “The Nuclear Non-proliferation Treaty in Jeopardy?” p. 16.

know the extent of the changes made in the P5s' nuclear programs. While the nuclear arms race among the major nuclear states may have already started, the values of restraint and strategic stability remain, based on which we should try to withhold and revive.

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Will North Korea Join Russia and China in a Combined Military Exercise? A Game Changer for Northeast Asian Security Architecture

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Abstract

Under North Korea's nuclear and missile development, trilateral security and military cooperation between the Republic of Korea, the U.S., and Japan seems unavoidable but the only security option against North Korea's threats. Threat assessments have focused much on existing threats like North Korean nuclear and missiles as well as new technology threats like artificial intelligence, cyber, drone, and cyberwarfare capabilities; they rarely focus on North Korean military cooperation with China and Russia. Interestingly, since the end of the Korean War and the withdrawal of the Chinese Volunteer Forces (CVFs) in the late 1950s, there has been no single combined military exercises between the Korean People's Army (KPA), People's Liberation Army (PLA) and the Russian Army over the seven decades. In 2018, the VOSTOK exercise was the first combined exercise between the Russian Army and the PLA in history, which drew a strong reaction from the Western communities. Now it is naturally a time for North Korea to join Russia and Chinese in a military exercise against the trilateral security partnership on the other side; yet, there has been no research on this possible scenario and has only focused on an independent North Korean threat. The possibility of the KPA joining a combined military exercise between the PLA and the Russian Army is under-researched but a very important forgotten topic and a game changer for Northeast Asian Security Architecture rather than many nuclear and missile tests of North Korea. This paper examines why North Korea never had a combined military exercise with the PLA or the Russian Army in the past, why now this could be a possible scenario, and how the ROK-US alliance should prepare for the dire scenario. This research hopes to educate policy makers about this under-researched topic and render policy implications for further development of the trilateral security partnership near future.

Introduction

North Korea's nuclear and missiles have been three-decade global security issues. Since the 1990s, South Korean and the U.S. administrations tried to solve North Korea's nuclear issues with a range of measures from strategic patience and international sanctions to Six-Party Talks and the Korean Peninsula Peace Process. Inter-Korea relations and the US-DPRK relations were sometimes good and mostly bad. However, an outcome after three-decade denuclearization efforts is unfortunately North Korea with more nuclear weapons and longer missiles. Now many experts and intelligence agencies have expected the seventh nuclear weapon test and tactical nuclear weapons in North Korea after the failure of the Hanoi Summit. Over the years, the security environment surrounding the Korean Peninsula has been a climax of the worst situations such as the US-China strategic competition, the arms race in Northeast Asia, and North Korea's continuous provocation. Because of this security environment, the Republic of Korea's government tries to strengthen the ROK-US combined military exercise, extended deterrence, the trilateral security partnership that includes Japan, and cooperation with NATO countries to prevent any potential physical conflict and deter North Korea's provocation. In addition, because of the Russia-Ukraine War, Trump's legacy, and the rise of Chinese military capabilities, there has been growing concern about the self-defense capabilities of South Korea. To that end, South Korea's nuclear armament has been considered, but it remains controversial in Seoul and Washington.

In this situation, strengthening ROK-US combined exercise and trilateral security partnership is an unavoidable security option for South Korea. Many security and regional experts have focused on North Korea's nuclear and missile capabilities and the Taiwan crisis. However, one game-changeable issue is still missing on the table of experts and government officials regarding Northeast Asia security issues – the possibility of North Korea joining Russia and China's military exercises and cooperation realm. In 2018, the US and Europe were surprised by Russia and China's combined military exercise during the VOSTOK exercise in the Far Eastern area because it was the significantly large-scale combined military exercise between Russia and China in history. Interestingly, most of the public did not know that there had been no meaningful large-scale combined military exercise between Russia and China – the long-term Cold War partners against the West. There had only been a few small-scale maritime or ground forces cooperations recently. Even during the Cold War, Russia and China had no major-scale combined military exercises but casualties between the two because of the Russia-Sino split. Thus, the 2018 VOSTOK exercise was a shock to security experts in the West and, at that time, many experts still interpreted it as a political symbol, not an actual practical level of military cooperation. However, as the new Cold War situation became more serious, the two countries had more large-scale combined military

exercises and a more practical level of military cooperation. India even joined these combined exercises. This military cooperation is not only a psychological burden to the West but also an actual military threat. This Russia-China military cooperation has widely been considered a security issue of European, Eurasian, and Chinese regions, not relating to the North Korea issue. As far as North Korea is concerned, nuclear weapons and missiles are the most dominant issue. Yet, this possible scenario of North Korea joining Russia and China's military cooperation is a fundamental game changer for the Northeast Asian security architecture and is still largely under-researched and overlooked. This study examines why North Korea never had any combined military exercises with her old allies, Russia and China, and demonstrates why North Korea now considers military cooperation with Russia and China. This is a new, understudied but very important topic for Northeast Asia and the Korean Peninsula security.

Literature Review

Many security experts on the Korean Peninsula are largely divided into two – the Nuclear Nonproliferation expert group and the Regionalist Group. Because the North Korean nuclear problem and the ROK-US alliance issues have been main topics for the Korean Peninsula security over the seven decades, since the 1990s, many nuclear nonproliferation experts take part in the Korean Peninsula security studies. For instance, in the policy community and academia located in Washington, D.C., traditional elites were regionalists who understand Asian issues, including political scientists, International Relations scholars, journalists, diplomats, military, think tanks policy experts, and historians. A stellar group of first-generation experts on the Korean Peninsula includes Don Oberdorfer, the author of *Two Koreas*; Bruce Cumings, a historian and author of *The Origins of the Korean War*; Selig Harrison, the author of *Korean Endgame*; Gregory Henderson, the author of *Korea: The Politics of Vortex*; Robert A. Scalapino, the author of *Communism in Korea*; and Suh Dae-Sook, the author of *Kim Il Sung*.

This group has few Korean experts because Korea was not a main topic as opposed to China and Japan, and their studies largely focused on the Korean War, Korean history, and Cold War studies.¹⁾ Since the 1990s, the North Korean nuclear

1) Bruce Cumings, *The Origins of the Korean War*, Volume 1: *Liberation and the Emergence of Separate Regimes, 1945-1947*(Princeton, NJ: Princeton University Press, 1981); *The Origins of the Korean War*, Volume 2: *The Roaring of the Cataract, 1947-1950*(Princeton, NJ: Princeton University Press, 1990); *Korea's Place in the Sun: A Modern History*(New York: W.W. Norton, 2005); *The Korean War: A History*(New York: Modern Library, 2011); Robert A. Scalapino and Chong-Sik Lee, *Communism in Korea: Part 1, The Movement*(Berkeley, CA: University of California Press, 1972); Robert A. Scalapino and Chong-Sik Lee, *Communism in Korea: Part 2: The Society*(Berkeley, CA: University of California Press, 1972); Suh, Dae-Sook, *The Korean*

issue became one of the nonproliferation issues, many nuclear nonproliferation experts and former foreign policy veterans joined regionalists on the Korean Peninsula studies. These include regionalist scholars –historians, sociologists, political scientists, and International Relations scholars –, journalists, and think tank policy experts.²⁾—Their research largely focused on North Korea’s nuclear or human rights issues like American foreign policy towards the two Koreas, denuclearization, extended deterrence, nuclear and missile capabilities, human rights, sanctions regime, famine, human rights, and the Korean Peninsula security.³⁾ Their research

Communism Movement, 1918-1948(Princeton, NJ: Princeton University Press, 1967); Suh, Dae-Sook, *Kim Il Sung: The North Korean Leader*(New York: Columbia University Press, 1988); Gregory Henderson, *Korea: The Politics of the Vortex*(Cambridge, MA: Harvard University Press, 1968); Don Oberdorfer and Robert Carlin, *The Two Koreas: A Contemporary History*(New York: Basic Books, 2013); Selig S. Harrison, *Korean Endgame: A Strategy for Reunification and U.S. Disengagement*(Princeton, NJ: Princeton University Press, 2002)

- 2) Bruce Bennett, Victor Cha, Charles K. Armstrong, Andrei Lankov, Gilber F. Rozman, Scott A. Snyder, David C. Kang, Bruce Klinger, Sue Mi Terry, Frank Aum, Andrew Yeo, Youngjun Kim, Jung Park, Jessica Lee, Lee Ji Young, Van Jackson, Patrick Cronin, Bruce E. Bechtol Jr., Jean Lee, Immanuel Kim, Suzy Kim, Gregg A. Brazinsky, David Shin and others as well as nuclear nonproliferation experts, human rights activists and foreign policy veterans such as Sig Hecker, Robert Karlin, Robert Gallucci, Joel Wit, Kathleen Stephens, Joseph Yun, Toby Dalton, Greg Scarlatoui, Sandra Fahy, Ankit Panda, Scott Sagan, Eric Brewer, Jeffery Lewis, Mark W. Lippert, Adam Mount, Jenny Town, Christopher R. Hill, and others.
- 3) Bruce W. Benett, *Preparing for the Possibility of a North Korean Collapse*(Santa Monica, CA: RAND Corporation, 2013); Bruce W. Benett and Jenifer Lind, “The Collapse of North Korea: Military Mission and Requirements” *International Security*36(2) (Fall 2011): 84-119.; Victor D. Cha, *Impossible State: North Korea, Past and Future*(New York: Ecco, 2012); *Powerplay: The Origins of the American Alliance System in Asia*(Princeton, NJ: Princeton University Press, 2016); Victor D. Cha and Ramon Pacheco Pardo, *Korea: A New History of South and North*(New Haven, CT: Yale University Press, 2023); Scott Snyder, *North Korea’s Foreign Policy*(New York: Rowman & Littlefield Publishers, 2022); *South Korea at the Crossroads: Autonomy and Alliance in an Era of Rival Powers*(New York: Columbia University Press, 2020); Jung H. Park, *Becoming Kim Jong Un: A Former CIA Officer’s Insights into North Korea’s Enigmatic Young Dictator*(New York: Ballantine Books, 2020); Ankit Panda, *Kim Jong Un and the Bomb: Survival and Deterrence in North Korea*(Oxford: Oxford University Press, 2020); David Shin, *Rationality in the North Korean Regime: Understanding the Kim’s Strategy of Provocation*(New York: Lexington, 2020); Andrew Yeo, *Activists, Alliances and Anti U.S. Base Protests*(Cambridge: Cambridge University Press, 2011); *State, Society and Markets in Politics and Society in East Asia*(Cambridge: Cambridge University Press, 2021); *Asia’s Regional Architecture: Alliances and Institutions in the Pacific Century*(Stanford, CA: Stanford University Press, 2019); Ji-Young Lee, *China’s Hegemony: Four Hundred Years of East Asian Domination*(New York: Columbia University Press, 2016); Immanuel Kim, *Laughing North Koreans: The Culture of Comedy Films*(New York: Lexington Books, 2020); *Rewriting Revolution: Women, Sexuality and Memory in North Korean Fiction*(Honolulu, HI: University of Hawaii Press, 2022); Joel S. Wit, Daniel B. Oneman and Robert L. Gallucci, *Going Critical: The First North Korean Nuclear Crisis*(Washington DC: Brookings Institution Press, 2004); Van Jackson, *On the Brink: Trump, Kim and the Threat of Nuclear War*(Cambridge: Cambridge University Press, 2018); *Pacific Power Paradox: American*

and policy reports also focus on the history of the two Koreas and the Korean War, analysis of North Korean state, society and regime, policy solutions against North Korean nuclear and missile threats and for denuclearization of North Korea as well as American foreign policy in East Asia, including the Korean Peninsula, and the ROK-US alliance issues.

However, there is no single study on the possibility of military cooperation between North Korea and China/Russia, perhaps, because it has not occurred, and no one has investigated why it has not occurred. In this research, I will examine why North Korea has not had any military exercises with China and Russia and why today North Korea may consider forming military cooperation and joining combined exercises of the Chinese People's Liberation Army and the Russian Army.

Statecraft and the Fate of the Asian Peace(New Haven, CT: Yale University Press, 2023); Sandra Fahy, *Dying for Rights: Putting North Korea's Human Rights Abuses on the Record*(New York: Columbia University Press, 2019); *Marching Through Suffering: Loss and Survival in North Korea*(New York: Columbia University Press, 2015); Gregg A. Brazinsky, *Nation Building in South Korea: Koreans, Americans, and the Making of a Democracy*(Chapel Hill, NC: The University of North Carolina Press, 2009); *Winning the Third World: Sino-American Rivalry during the Cold War*(Chapel Hill, NC: The University of North Carolina Press, 2017); David C. Kang, *American Grand Strategy and East Asian Security in the Twenty-First Century*(Cambridge: Cambridge University Press, 2017); *East Asia Before the West: Five Centuries of Trade and Tribute*(New York: Columbia University Press, 2010); Bruce E. Bechtol Jr., *North Korean Military Proliferation in the Middle East and Africa: Enabling Violence and Instability*(Lexington, KY: University Press of Kentucky, 2018); *The Last Days of Kim Jong-il: The North Korean Threat in a Changing Era*(Washington DC: Potomac Books, 2013); *Red Rogue: The Persistent Challenge of North Korea*(Washington DC: Potomac Books, 2007); Gilbert Rozman, Sue Mi Terry and Eun A Jo, *South Korea's Wild Ride : The Big Shifts in Foreign Policy from 2013 to 2022*(London: Routledge, 2023); Gilbert Rozman, *Strategic Triangles Reshaping International Relations in East Asia*(London: Routledge, 2022); Youngjun Kim, *Origins of the North Korean Garrison State: The People's Army and the Korean War*(London: Routledge, 2017); "Why did Stalin not support a Quick Victory for the Korean People's Army? Stalin's Unspoken Global Security Strategy for the Korean War" *The Korean Journal of International Studies*17(1) (April 2019): 79-102; Toby Dalton and Youngjun Kim, "Negotiating Nuclear Arms Control with North Korea: Why and How?" *The Korean Journal of Defense Analysis*33(1) (March 2021): 1-21.; Charles K. Armstrong, *The North Korean Revolution, 1945-1950*(Ithaca, NY: Cornell University Press, 2003); Suzy Kim, *Everyday Life in the North Korean Revolution, 1945-1950*(Ithaca, NY: Cornell University Press, 2013); Andrei Lankov, *From Stalin to Kim Il Sung: The Formation of North Korea, 1945-1960*(New Brunswick, NJ: Rutgers University Press, 2002); *Crisis in North Korea: The Failure of De-Stalinization, 1956*(Honolulu, HI: University of Hawaii Press, 2005); *Real North Korea: Life and Politics in the Failed Stalinist Utopia*(Oxford: Oxford University Press, 2013)

Main Factors for Why Not

There have been almost no academic and policy studies on why the Korean People's Army has never had combined exercises with the People's Liberation Army of China and the Russian Army during the Cold War and in the post-Cold War period. It is probably because of the widespread perception that North Korea and China were bloody brothers during the Korean War, which remains intact. Since the withdrawal of the Chinese Volunteer Forces in the late 1950s because of failed efforts to remove Kim Il Sung by a pro-Chinese faction in 1956, there has not been military cooperation between North Korea and China, nor have there been foreign liaison officers in the KPA. So far, North Korea has maintained diplomatic and economic relations with China and Russia, not military relations except for some logistic and military equipment trade.

Because of the development of the Republic of Korea and the U.S. combined exercise, military cooperation, and United States Forces in Korea for the last seven decades, natural reactions of North Korea would have been similar actions such as combined military exercises with her allies, China and Russia, or military bases of the PLA or the Russian Army in North Korea. Since there are neither foreign troops in North Korea nor combined exercises between the KPA and foreign troops, an intriguing question that academic and policy experts, intelligence agencies, and military and government departments of the ROK and the U.S. concerning North Korea might ask would be why North Korea does not consider these options. However, a myth of North Korea and China / Russia (the Soviet Union) as alliances has been never asked. So far, scholars, experts, journalists, intelligence agencies, military, diplomats, and other government officials did not raise this simple question and overlooked the importance of looking into the question. A myth and stereotype have hindered many important questions from being asked and led policy towards North Korea in the wrong direction. This is one of the many question that have not been asked, which experts, policymakers, and their advisors must consider for better policy design and making.

There have been various reasons why North Korea has not had foreign troops in North Korea and never had a combined exercise with China and Russia despite its counterparts strengthening the trilateral security and military partnership against North Korea. In this study, I will provide a number of reasons why North Korea did not have a military exercise with the PLA and the Russian Army by exploring North Korean history, domestic politics, collective trauma, and psychological elements throughout history as well as its nationalism – so-called Juche Ideology.

The Korean War Legacy and a Search for the Juche's Army

The Korean War is an important factor in understanding the nature of the North Korean state. Democratic People's Republic of Korea (DPRK) was founded in 1948. Throughout the Korean War, DPRK became a garrison state because of a strong legacy of the Korean War. Through the Korean War, Kim's regime and the North Korean people learned two important lessons: they should never believe foreign countries, and they must defend themselves.

After the end of the Cold War, many classified documents, including those of China and Russia, became declassified and available to the public. Based on these primary sources, many post-revisionist historians on the Korean War interpreted the Korean War from a new perspective. For instance, Shen Zhihua argued that because of the Sino-Soviet relations, Stalin approved Kim's plan to invade the South. The Sino-Soviet relations were very complicated at the initial stage and never went well according to newly declassified Chinese primary sources.⁴⁾ Based on primary sources from Russia, Kathryn Weathersby pointed out that the Soviet Union deeply supported and engaged in the initial planning stage of North Korea's invasion of South Korea, including telegrams between Stalin and Kim Il Sung.⁵⁾

According to Youngjun Kim, Kim Il Sung was very humiliated during the Korean War not just by its main enemies, the U.S. and South Korea but also because of its senior partners, the Soviet Union and China, which only cared about their national interests but not the costs of North Korean people throughout the Korean War. Kim never believed in dependency on foreign troops for the destiny of North Korea and strongly believed that North Korea must defend itself.⁶⁾ During the Korean War, the Soviet Union sent an advisory group that assisted North Korea with an invasion plan at the initial stage. However, when the KPA was in a crisis after the Incheon Landing operation, the Soviet Union advised Kim Il Sung to give up the war

4) Shen Zhihua, *Mao, Stalin and the Korean War: Trilateral Communist Relations in the 1950s*(London: Routledge, 2012)

5) Kathryn Weathersby, "Soviet Aims in Korea and the Origins of the Korean War, 1945-1950: New evidence from the Russian Archives." *Cold War International History Project Working Paper*8. (November. 1993.) The Woodrow Wilson International Center for Scholars.; "New Evidence on the Korean War" *Cold War International History Project Bulletin*6/7 (1995) The Woodrow Wilson International Center for Scholars., 30-125.; "To Attack or Not Attack? Stalin, Kim Il Sung, and Prelude to War" *Cold War International History Project Bulletin*Vol. 5. (1995) The Woodrow Wilson International Center for Scholars.; "Should We Fear This? Stalin and the Danger of War with America." *Cold War International History Project Working Paper*. No. 39. (2002) The Woodrow Wilson International Center for Scholars.; "New Evidence on North Korea" *Cold War International History Project Bulletin*14/15 (2003) The Woodrow Wilson International Center for Scholars, 5-138.

6) Youngjun Kim, *Origins of the North Korean Garrison State: The People's Army and the Korean War*(London: Routledge, 2017)

and flee to Manchuria while Chinese Volunteer Forces Leader Peng Dehuai ignored Kim Il Sung and commanded the CVF without listening to Kim Il Sung during the war. In the end, Stalin and Mao did not want an armistice but delayed the war as long as possible for their own interests by ignoring the casualties of North Korean people who were attacked by air bombing campaigns in North Korea for the last two years.⁷⁾

After the Korean War, Kim Il Sung and the North Korean people appreciated China's help and support that helped North Korea to survive. However, the stronger sentiment was that they would never get any military and defense engagement from China and the Soviet Union for their survival again and they must defend themselves.⁸⁾ After the 1956 crisis and a withdrawal of the CVFs from North Korea, North Korea has continuously searched for self-defense capability based on Juche Ideology (Self Reliance theory), and nuclear weapons was a magic solution to achieve this goal without depending on foreign troops. Before becoming the leader of North Korea, Kim Il Sung and his group were experienced guerilla forces who worked with Chinese guerillas against the Japanese Army and then became the Soviet Army 88th Reconnaissance Brigade.⁹⁾ These experiences convinced Kim Il Sung that self-defense capability would be the only tool in guaranteeing independence and maintaining political power. During the Soviet-Sino split in the 1960s, North Korea used balanced diplomacy between the two giant countries – the Soviet Union and China. Détente was a shock to Kim Il Sung because China never talked to North Korea before a surprising meeting between Mao and Nixon in the 1970s.¹⁰⁾

This intricate international environment led North Korea to seek an independent position and self-defense capability without dependency on foreign troops. Its

7) Youngjun Kim, “Why Did Stalin Not Support a Quick Victory for the Korean People’s Army? Stalin’s Unspoken Global Security Strategy for the Korean War” *The Korean Journal of International Studies*17(1) (April 2019): 79-102.; Kim Donggil, “Stalin’s Korean U-Turn: The USSR’s Evolving Security Strategy and the Origins of the Korean War.” *Seoul Journal of Korean Studies*24(1) (June 2011): 89-114.; Kathryn Weathersby and Kang Gyu-hyong, “Puk-Chung-So Samgakkwan’gyega 6.25 Chonjaeng Kwajonggwa Chonhu Puk’anoegyo Haengt’ae Mich’in Yonghyang: KimirhaejemunSORUL Chungshimuro (Influence of Triangle Relations among North Korea, China and the Soviet Union and the Korean War on North Korean Foreign Policy: Based on Declassified Documents.” *Chongshin Munhwa Yon’gu (Studies on Spiritual Culture)*33(3): 117-142.

8) Youngjun Kim, *Origins of the North Korean Garrison State: The People’s Army and the Korean War* (London: Routledge, 2017), 230-237.

9) *Ibid*, 35-85.; Suh, Dae-Sook, *Kim Il Sung: The North Korean Leader*(New York: Columbia University Press, 1988); Bruce Cumings, “Corporatism in North Korea” *The Journal of Korean Studies*4 (1982-1983): 269-294.

10) Shen Zhihua and Li Danhui, *After Learning to One Side: China and Its Allies in the Cold War*(Stanford, CA: Stanford University Press, 2011); Shen Zhihua and Xia Yafeng, *Mao and the Sino-Soviet Partnership, 1945-1959*. (Washington DC: Lexington Books, 2015); Shen Zhihua and Xia Yafeng, *A Misunderstood Friendship: Mao Zedong, Kim Il-sung, and Sino-North Korean Relations, 1949-1976*.(New York: Columbia University Press, 2020)

dependency on one side – the Soviet Union or China – was not an option for North Korea and was even dangerous for North Korea. The Korean War legacy convinced North Korea that self-defense capability without the support of foreign troops would be the only tool for its survival, and a complicated Cold War situation made North Korea believe this more and more. A search for the Juche's Army as a small nation natural led to a search for a magic weapon – nuclear weapons. In this context, nuclear weapons are not only a sword against their main enemies, the U.S., Japan, and South Korea, but also a shield against influences of bigger neighboring countries, China and Russia.

A Fear of Domestic Political Rivals

To Kim's regime, external threats have been South Korea, the U.S., and Japan, and internal domestic rivals were pro-Chinese factions. In the early days of North Korea, Kim Il Sung's group was the smallest faction but was supported by the Soviet Union. The largest group was composed of domestic communists led by Park Hon-yong, the first foreign minister of North Korea and legendary activist on communism during the Japanese colonial period. The elite group favored China, the so-called Yeonan group that welcomed political and military elites such as Kim Tu-bong, Pang Ho-san, Nam Il, and Mu Chong. In particular, the pro-China group influenced the KPA because many veterans of former Korean Chinese soldiers joined the KPA from China between 1949 and 1950.

On the eve of the Korean War, the former Korean Volunteer Army (KVA) and former Maoist Army against the Chinese Nationalists during the Chinese Civil War dominated most of the key positions of the KPA, including about 95 percent of political commissar posts and about 50 percent of generals. Kim Il Sung's group was working with China, not as a regular army of the Maoist Army, but as guerilla forces before they went to the Soviet Union in 1941. Thus, the pro-China group naturally had strong personal relations with the elites of the Chinese Communist Party. During the Korean War, Kim Il Sung feared a rise of the pro-China group when the CVFs dominated the war under the leadership of Peng Dehui, the leader of the CVFs.¹¹⁾ Kim Il Sung purged Park Hon-yong during the Korean War. However, at the time, the pro-China group increased its influence thanks to Chinese support. The 1956 Crisis led by the pro-China group, a failed attempt to remove Kim Il Sung, was at a climax. Kim Il Sung decided to expel CVFs for minimizing Chinese influence.¹²⁾

11) Youngjun Kim, *Origins of the North Korean Garrison State: The People's Army and the Korean War* (London: Routledge, 2017), 146,168.; Yi Chongsok, *Puk'an Chungguk Kwan'gye, 1945-2000 (Sino-North Korean Relations, 1945-2000)* (Seoul: Joongsim, 2000)

12) Andrei Lankov, *Crisis in North Korea: The Failure of De-Stalinization, 1956* (Honolulu, HI: University of Hawaii Press, 2005); James F. Person, "We Need Help from Outside: The North

When the Cold War ended in 1991, the Soviet Union stopped to support North Korea, and, in turn, North Korea's dependency on China was largely increased. Kim Jong Il feared a rise of Chinese influence because of economic dependency on China and gambled a new way to build relations with South Korea, the U.S., and Japan. Kim Jong Il invited South Korean President Kim Dae Jung, Japanese Prime Minister Junichiro Koizumi, and U.S. State Secretary Madeleine Albright to Pyongyang. Had Al Gore won the Presidential Election against George W. Bush, Kim Jong Il's new adventure would have been successful. However, the new Bush Administration defined North Korea as a rogue state and axis of evil. When Kim Jong Il faced massive famine, he focused on developing nuclear weapons. An intriguing and unsolved question is why Kim Jong Il's North Korea survived after millions of deaths but did not ask for massive Chinese support to feed North Korean people. Since 1991, North Korea's economic dependency on China radically increased and today more than 95 or 99 percent of North Korea's total trade is with China only. During the 1990s, Kim Jong Il only focused on nuclear weapons development and did not seek a combined military exercise with China's PLA or reintroduction of Chinese forces against the ROK-US combined exercise and military cooperation as well as USFK in South Korea.

Kim Jong Un became a leader, purged pro-Chinese political rivals, Jang Sung Taek and Kim Jong Nam, and gambled a new adventure with the Moon administration and the Trump administration with nuclear weapons. After a failed Hanoi Summit, Kim Jong Un focused to develop nuclear and missile capabilities and back to its old friends, China and Russia. Over the seven decades, North Korea searched for nuclear and missile capabilities against the ROK-US alliance, but its relations with China and Russia have been maintained on the diplomatic and economic level, not the military level. The ROK-US military alliance has been strong against North Korea; the USFK is one of the largest scales of the US forces in foreign countries. Only nuclear weapons and missile are not enough for North Korea in terms of military capabilities, but North Korea never took part in any combined exercise and asked China or Russia for any troops. This study argues that the Korean War legacy, a search for the Juche Army, and a fear of domestic political rivals are the main reasons why North Korea has not considered its military cooperation with either China or Russia as a viable option for over decades.¹³⁾

Korean Opposition Movement of 1956" *Cold War International History Project Working Paper#52* (August 2006) The Woodrow Wilson International Center for Scholars.

13) Youngjun Kim, "North Korea's Relations with China and Russia in the Security Realm" in Jaewoo Choo, Youngjun Kim, Artyom Lukin, and Elizabeth Wishnick, *The China-Russia Entente and the Korean Peninsula. NBR Special Report* no. 78. March 29, 2019. The National Bureau of Asian Research.

Main Factors for Why Now

Over the decades, North Korea has focused on nuclear and missile development, not military exercise with foreign troops, and emphasized Juche Ideology and nuclear power armed state. International environments characterized by the Russian Ukraine War and the US-China strategic competition made the world more like Machiavelli's world, and liberal institutionalism's world, the post-1945 world system, has been weakened. In this situation, the US wants to save liberal internationalism by cooperating with like-minded countries in Europe and Indo Pacific region. Revisionist and authoritarian states such as China and Russia are the main threats to liberal international order and the US led a strong network against this challenge. In Indo Pacific region, the Republic of Korea and Japan are key countries along with Australia, India, and New Zealand as well as Southeast Asia against China while NATO countries are key countries against Russia. In this environment, the Republic of Korea and Japan have chosen to enhance their security and military partnership with the US against North Korean threats and the rise of China. For North Korea, nuclear weapons and missiles are not enough against this global partnership, and it needs more options to increase its security and guarantee its survival. Thus, now, it seems reasonable to expect North Korea to seek more possible options for enhanced security.

The New Cold War

The rise of China has changed many aspects of the world politics. China will surpass the US in the economy in the near future and its influence in foreign policy and military capability becomes more dominant beyond the Chinese mainland. Taiwan contingency has been a main concern of the world community and many experts and military expect that China will invade Taiwan sometime soon like 2027.¹⁴⁾ The rise of the Chinese military was double edge sword for North Korea. A stronger PLA is good for North Korea as combined efforts against the US, Japan, and the ROK. But, at the same time, too strong and too powerful China has always been a fear of North Korea because of Chinese political influence and a rise of pro-China domestic rivals. Nonetheless, strong China as one team is generally a good environment for the survival of North Korea. Recently, an important shift started in this region – Russia-China combined military exercise. In 2018, the Russia-China combined military exercise took place in the Far Eastern area of Russia during the 2018 Vostok

14) Eldridge Colby, "America Must Prepare for a War over Taiwan: Being Ready is the Best Way to Prevent a Fight with China" August 10, 2022. *Foreign Affairs.*; Amy Hawkins, "Taiwan foreign minister warns of conflict with China in 2027" *The Guardian.* April 21, 2023.

exercise. It became an international sensation because of its possible impacts on international security. Many experts expected that it was only a diplomatic gesture and political symbol against the West because Russia and China were still strategic competitors. However, as time went by, Russia and China's combined military exercises increased their scale, depth, and details between the Russian Army and the PLA.

Today, many experts, including Richard Weitz of the Hudson Institute, consider Russia and China's combined military exercise as long-term military cooperation, not a short-term event.¹⁵⁾ So far, North Korea does not engage in any actions like military exercise with the PLA and the Russian Army. However, during the Vietnam War, North Korea deployed a small number of the KPA in Vietnam, and recently a rise of the trilateral security and military partnership among the US, ROK, and Japan has concerned North Korea. There is no evidence of how North Korea will react to the Taiwan contingency or possible conflicts between the US and China. However, different from inter-Korea conflicts, great power competitions are not controlled by small nations, and North Korea closely watches a series of possible conflicts in Northeast Asia. In particular, the Taiwan contingency will make the Korean Peninsula engage in a conflict because of a possible deployment of USFK toward a conflict zone. Two Koreas cannot be not related in the issues of the US and China strategic competition if the US and China fight near Taiwan or the South China Sea. Because of the complexity of regional conflict, the US, ROK, and Japan have maintained communication channels and shared intelligence and information. North Korea naturally is not avoidable to cooperate with the Chinese PLA for its survival and preparing any type of scenario which will impact its survival. During the Obama Administration, the North Korean contingency and collapse scenario was a main concern and topic that the ROK and the US should prepare for. Now, the Taiwan contingent situation is the most likely and dangerous scenario in the region and the two Koreas cannot avoid its deep engagement in this conflict because of the USFK and deep partnership with its allies.

During the Cold War, the Soviet Union and China were not friendly. During détente, China was with the U.S. In the New Cold War, Russia and China strongly stand together and the Russia-Ukraine War and the Taiwan contingency made them more closely against the West. During the Cold War, North Korea maintained double diplomacy between the Soviet Union and China, but now North Korea needs to choose defense alone or work with the PLA and the Russian Army against the stronger counterpart military partnership. To North Korea, it is a time to work with the PLA and the Russian Army. Nuclear weapons and missiles are not enough for North Korea's survival in the new Cold War conflicts that might be triggered by the Taiwan contingency. As opposed to the nuclear weaponry and missiles of China, Russia, and

15) Richard Weitz, *Assessing Chinese-Russian Military Exercises: Past Progress and Future Trends*. (July 2021) Center for Strategic and International Studies.

the US, North Korea's nuclear weaponry and missile capabilities are small and weak and do not guarantee its survival. The KPA was too weak, too small, and too outdated with no logistics, no supplies, and no ammunition against the ROK, US, and Japan's combined military capabilities. North Korea's military engagement with the PLA and the Russian Army is not a choice but only a survival option. The only important thing is when North Korea will join Russia and China's military partnership and what types of areas North Korea will cooperate in with the PLA and the Russian Army. It will be difficult for North Korea to receive the PLA and the Russian soldiers stationed in North Korea sometime soon, but sending a small number of KPA soldiers and units and collaborating on cyber, information, propaganda and psychological war are the easiest way to start soon. To prepare for a possible conflict on the Korean Peninsula, a nuclear-armed KPA is a possible deterrence tool, but beyond the Korean Peninsula, the KPA without the PLA and the Russian Army is too weak against the US, ROK, and Japan's combined military capabilities.

The Trump Legacy

Trump left strong legacies to the world communities and Trumpism is still strong in US politics. South Korea's nuclear armament debate is not just because of the North Korean threats and the Russia-Ukraine War but also a fundamental fear of Trump again. North Korea also learned many lessons from the Trump era. A failed denuclearization summit was clear but Trump's unconventional approach to international politics and alliances made a strong impression. Weaken alliances and peace treaty negotiations were welcome by North Korea, but at the same time, the uncertainty of Trump's unconventional foreign policy caused strategic instability in the region. For instance, Trump mentioned a possible nuclear development of South Korea and Japan by reducing US forces in Korea and Japan while maintaining a strong stance on China. The bigger nuclear button and Fire and Fury comments were also unforgettable to North Korea. Trump's national security staff's memoirs and interviews show that a nuclear war was most likely in 2017.¹⁶⁾ Trump's unconventional, unpredictable foreign policy was an opportunity and a threat to North Korea.

The more important thing is that Trump has not gone away and Trumpism is

16) John Bolton, *The Room Where It Happened: A White House Memoir*(New York: Simon & Schuster, 2020); Mike Pompeo, *Never Give an Inch: Fighting for the American I Love*(New York: Broadside Books, 2023); Van Jackson, *On the Blink: Trump, Kim, and the Threat of Nuclear War*(Cambridge: Cambridge University Press, 2018); Michael Wolff, *Fire and Fury: Inside the Trump White House*(New York: Henry Holt and Co., 2018); Bob Woodward, *Fear : Trump in the White House*(New York: Simon & Schuster, 2018); Bob Woodward, *Rage*(New York: Simon & Schuster, 2020)

getting stronger in American Politics. American people's support for the America First policy has been stronger now than during the Trump era. Foreign policy elites of Democrats and Republicans are not very different and similar. However, the America First policy is a complex problem not only for allied nations but also counterparts such as North Korea. Strategic instability makes the nation seek stronger deterrence capability beyond the status quo. More nukes and longer missiles are not different from the status quo to North Korea's survival capability. Self-defense capability works in an era of strategic stability during the Cold War and post-Cold War. However, during the Trump era, no nation feels more security but more insecure and fear of uncertainty. Because of the America First policy, if Trump is back or someone with a similar outlook comes to power, allied nations will seek more deterrence capabilities like European countries did during the Trump era or develop their own nuclear weapons rather than extended deterrence. Because of the arms race and security dilemma, not only allied nations of the US but also North Korea will seek more deterrence capabilities and stronger security options. In this context, more nukes, smaller nukes like TNW, longer ICBM, and hidden SLBM are not options for stronger deterrence, but a stronger military partnership with China and Russia could be a game changer that will enhance North Korea's survival capability and stronger combined deterrence capabilities against the US, ROK, and Japan. Therefore, the Trump factor and Trumpism could be one main factor for North Korea to seek non-considerable security options like military engagement with the PLA and the Russian Army.

Russian and Chinese Perspectives on North Korea as a Military Partner

It is important to understand Russian and Chinese perspectives on North Korea as military partners. Russian and Chinese open diplomatic positions are supportive of diplomatic solutions and peace and stability on the Korean Peninsula. Moreover, according to China's long tradition of the PLA's principles regarding external relations, the PLA will not have military bases in oversea countries except the Peace Keeping Forces. And China will not have a military alliance with the Third World countries. Thus, the Russian and Chinese position for peace on the Korean Peninsula never changed openly and the PLA's principles had been continued. However, recently, the US, ROK, and Japan's trilateral security partnership has been growing. Since the 2018 VOSTOK exercise, Russia and China have developed a stronger military partnership than ever. Because of the changes in regional and international situations, although the PLA does not have military bases in Russian territory, the PLA and the Russian Army have had larger and bigger scale combined military exercises in Russian and Chinese territories since 2018. In different situations, the PLA's principles could be changed at any time. So far, there has been no significant

military cooperation between Russia/China and North Korea. However, there will be growing possibilities of a joint military partnership between these three countries against a growing military partnership between the US, Japan, and the ROK. Tradition or principles will not apply to the future PLA, Russian Army and the KPA's military cooperation and partnership. The three countries' military partnerships are both reactive against their counterparts and proactive against the possible development of their counterpart military partnership. In this context, all scenarios are possible and open for future PLA, Russian Army, and the KPA military partnership. The following scenarios are feasible in the future.

Possible Scenarios and Policy Implications

If North Korea joins Russia and China's combined military exercise or deep military engagement, it will be a nightmare scenario for the Republic of Korea, the U.S., and Japan, and its potential impact will be much larger than additional nuclear weapons and missile tests. Hundreds of thousands of the KPA soldiers in the Russian Far Eastern area or Manchuria or hundreds of thousands of the PLA and the Russian soldiers near the Demilitarized Zone (DMZ) or a combined naval exercises sea near Wonsan area or Northern Limited Line (NLL) will be a disaster for the ROK security as well as Northeast Asian strategic stability. North Korea may also join information, psychological, propaganda, and cyber warfare with China and Russia. Moreover, China and Russia can deploy their tactical nuclear weapons and missiles and install radar system in North Korea. In the situation room of the KPA, the PLA, and the Russian Army during a combined military exercise, Seoul could be a target of nuclear weapons, missiles, and artilleries of the PLA and the Russian Army in their operational action plans.

All of these possible scenarios have been never considerable scenarios, but no one can stop any of these scenarios because all scenarios would be possible scenario because all scenarios would be decided by their sovereignties. There is not a single logical reason to blame North Korea, China and Russia if any of the scenarios happen. All will be much more like a security dilemma and arms race situation toward a possible Third World War. To prevent these worst scenarios, a road towards the Third World War, from happening, I propose the following suggestions.

First, the ROK, the US, Japan, and all like-minded countries including Australia, New Zealand, Southeast Asian countries, and NATO countries have to pay attention to possible military cooperation between North Korea, China, and Russia and all these countries have to strengthen their military partnership and efforts together. The creation of NATO in the Indo-Pacific will be one option. The United Nations Command (UNC) was created for peace and stability on the Korean Peninsula. Thus, the UNC countries could use the UNC as a foundation for NATO in the Indo-Pacific

region. More cooperation of all these countries in cyber, sea, space, and other domains are needed.

Secondly, to minimize the chance of military cooperation between North Korea and China/Russia, a decoupling strategy between North Korea and them should be considered. North Korea wants a peace treaty and security guarantee by nuclear negotiation with the US. Some sanction release is also a request of North Korea to give up some capabilities of nuclear weapons and missiles. So far, CVID or FFVE, namely all or nothing approach, has been adopted in North Korea's case over the three decades. This approach includes 1) asking North Korea to give up all nuclear weapons, including nuclear facilities and materials, based on verification and 2) offering North Korea rewards such as sanction release, normalization of the US-North Korea relations, and a peace treaty. However, over the three decades, this strategy has repeatedly failed, leading to denuclearization efforts only in theory, not in action.

Thus, the next step should be decoupling between North Korea and China. After all, North Korea's two grand strategic goals are a security guarantee of the North Korean regime and economic and political independence from China economically and politically because North Korea has been economically colonized by China since 1991. Threat reduction approach, tension reduction approach, step-by-step approach, and nuclear arms control approach are now mainstream approaches in Washington DC policy communities for decoupling strategy aiming at North Korea and China complex relation because reducing nuclear threats are much better than doing nothing and only saying CVID. Recent studies undertaken by the following experts, including Toby Dalton, Ankit Panda, Youngjun Kim, Sharon Squasooni, Eric Brewer, Jeffery Lewis, Adam Mount, Van Jackson, Frank Aum, Jenny Town, Joseph Yun, Jessica Lee, and others suggest these approaches after the failed Hanoi Summit in 2019.¹⁷⁾ A goal of this practical approach is exactly same as CVID and FFVD – Nuclear Zeron in the end, but these experts consider a realistic and pragmatic approach. These realistic and pragmatic approaches will ensure strategic

17) Toby Dalton and Youngjun Kim, "Negotiating Nuclear Arms Control with North Korea: Why and How?" *The Korean Journal of Defense Analysis* 33(1) (March 2021), 1-21.; Jeffrey Lewis, "It's Time to Accept That North Korea Has Nuclear Weapons" *The New York Times*. October 13, 2022.; Eric Brewer and Sue Mi Terry, "It Is Time for a Realistic Bargain With North Korea: Denuclearization Is Probably Out of Reach for Now - but It Might Be Possible to Reduce the Nuclear Threat" *Foreign Affairs*. March 25, 2021.; Sharon Squasooni, *Denuclearization of the Korean Peninsula: An Arms Control Framework*, November 18, 2022.; Frank Aum and Jessica J. Lee, "Beyond Deterrence: A Peace Game Exercise for the Korean Peninsula" *Quincy Brief* No. 20. February 14, 2022. Quincy Institute for Responsible Statecraft.; Van Jackson, "Risk Realism: The Arms Control Endgame for North Korea Policy. September 24, 2019. Center for New American Security.; Jina Kim, Toby Dalton, and Youngjun Kim, "Korean Peninsula Conventional and Nuclear Arms Control Linkage" *2021 International Joint Research Project* (Seoul: Research Institute of National Security Affairs of the Korea National Defense University, 2021), 1-46.

stability on the Korean Peninsula and enable North Korea to be independent militarily from China or Russia – foreign troops – and keep its Juche Ideology. This could reduce the likelihood of the worst scenario – North Korea joining Russia and China’s military cooperation and combined exercise.

Conclusion

This study examines why North Korea did not have any combined military exercises and foreign troops in North Korea over the seven decades since the withdrawal of the CVFs in the late 1950s and why North Korea is able to consider all of them today. The main question of this research has been never asked and never answered. The New Cold War situation made the Korean Peninsula and Northeast Asia a more dangerous place and a possible place for the Third World War near future. Many experts consider Taiwan and the Korean Peninsula as the most likely war places for the New Cold War. In this situation, more military partnerships between the ROK, the US, and Japan are needed and unavoidable because of the rise of China and Russia-China military cooperation as well as North Korea’s nuclear and missile threats. In other words, North Korea needs more security options than its nuclear weapons and missiles. Russia and China’s combined military exercises and military cooperation have continued and will be strengthened. Naturally, North Korea will consider strengthening a military partnership with China and Russia. All these situations will lead to strategic instability, security dilemma, and arms race. This will be a road towards the Third World War. In this study, I propose two policy suggestions. More military and security partnerships between like-minded countries are needed, and a new realistic and pragmatic approach toward North Korea’s nuclear weapons and missiles should be adopted to minimize a likelihood of North Korea joining China and Russia’s military cooperation. This study provides a foundation for further research and policy implications for policymakers.

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A Study on the Strengthening Space Cooperation between South Korea and the EU

Geunho Song

Abstract

After exploring ways to strengthen space cooperation between South Korea and the European Union to improve South Korea's space competitiveness in the new space era, this study seeks to propose five policy suggestions. First, space technology development and international cooperation should be strengthened to respond to changes in the global space development environment and to realize Korea's space economy in the future. Second, it is essential for South Korea to closely monitor and analyze the international space development situation, such as Europe's space strategy and space program, develop its future space policy, and implement its space development plans. Third, international cooperation in space activities will allow the possible recruitment of excellent space personnel and cultivate future national talent. Fourth, in response to the recent space threats from Russia and China, South Korea and European countries should strengthen their cooperation in the defense sector. Fifth, by establishing and operating the Korea Aerospace Agency (KASA), South Korea should manage its space activities and promote cooperation with the space organizations of advanced countries.

Keywords: *Space cooperation, Space development, space power, European Space Agency(ESA), Korea Aerospace Agency(KASA)*

Introduction

In November 2022, President Yoon Suk Yeol announced a roadmap for the future space economy. It included policy directions for the Republic of Korea to become a space economy powerhouse by 2045. The six policy directions were to explore the moon and Mars, leap forward as a space technology powerhouse, foster the space industry, foster space talent, realize space security, and lead international cooperation.¹⁾ President Yoon proposed a blueprint to strengthen cooperation with advanced space developers to expand South Korea's economic sphere to space and grow South Korea's space power.

In the era of New Space, where the private sector emerges as the subject of space technology innovation, major space-advanced countries are creating innovative space technology and strengthening their competitiveness in the space industry through cooperation between the private sector and the government. In addition, global companies are competing to dominate new markets such as the space Internet and space tourism services, providing new services such as reusable projectiles and space debris removal.²⁾ Europe's space industry accounts for more than 20% of the global market in the space sector, creating economic value for Europe.³⁾ Korea's international cooperation and technological exchanges with European countries over the years have facilitated its space development.

Until now, research on Europe's space activities has been focused on analyzing the European Union's space programs, such as the role of space in implementing the European Union's joint security and defense policy and European space exploration from a science and technology diplomatic perspective. Chung Young-jin assessed that the European Union is trying to gain political and economic independence in the international community through space and take the lead in international relations by becoming the global powerhouse in science and technology.⁴⁾ Choe Nam-mi proposed some policy implications for South Korea's space exploration strategy through her analysis of European space policy and space exploration, which are fully diplomatic in the field of space.⁵⁾ Jeong

1) Presidential Office, "President Yoon Announces Future Space Economy Roadmap," Nov. 28, 2022, <https://www.president.go.kr/newsroom/press/Uc8g7TAf>(accessed on April 28, 2023).

2) Ahn Hyun-joon and Park Hyun-joon. 2021. "A plan to expand public-private cooperation to enhance the competitiveness of the space industry in the new space era." *STEP Insight*, No. 273, 2021.

3) European Commission, "The future of the European space sector," 2019, https://www.eib.org/attachments/thematic/future_of_european_space_sector_en.pdf.

4) Jung Young-jin. "The role of the Universe in the Implementation of the Common Security and Defense Policy of the European Union." *Journal of aerospace policy and law* 34, no.2 (2019): 329-346.

5) Choe Nammi, "Europe's Space Exploration and Korea's Space Exploration Strategy from the Perspective of Science and Technology Diplomacy." *J. Space Technol. Appl.* 2022;2(3):195-205.

Seo-young analyzed the latest technology strategy of the European Space Agency and explained the current status of space technology development that actively reflects industrial demand to strengthen industrial competitiveness in the space field.⁶⁾ The previous studies above suggest that in developing space technology, space exploration, and joint security defense in Europe, the role of space is indispensable, but in-depth research is needed on major issues of space cooperation and ways to strengthen cooperation between South Korea and the European Union in the era of the Fourth Industrial Revolution.

The European Union is trying to ensure safe space use and implement continuous space activities through cooperation with partner countries in space exploration and space situational awareness, which use huge budgets. In a situation where cooperation in international space activities is expected to be strengthened, Korea should develop space science and technology and actively participate in international cooperation. This study aims to identify tasks for space cooperation between South Korea and the European Union, and to find out the issues concerning space development and ways to strengthen cooperation between South Korea and the European Union. It is crucial that in response to the recent threats from China and Russia in space, they establish a strategy to strengthen space capabilities as partners in space cooperation while utilizing and supplementing the strengths and weaknesses of their space development capabilities.

Space Activity Cooperation Trend

Changes in the Global Space Activity Environment

Due to the development of private capital and high-tech capabilities in the new space era, the private sector has expanded its role in government-led space development, making the private sector the subject of space technology innovation. Competition for space exploration is expanding around the world, with space-advanced countries planning manned exploration activities to the Moon and Mars. In 2022, South Korea launched a lunar orbiter, which it has been operating to conduct research and explore lunar resources. Advanced space countries have established and promoted space activity policies focusing on expanding space exploration and fostering the private space industry. It promotes understanding of the universe and creates new values and economies through new technologies. Large-scale budget space exploration, satellite navigation system construction, and space security are areas where international cooperation is increasing because it

6) Soyoung Chung, Gi Won Nam, "European Space Technology Coordination & Planning and ESA's Technology Strategy," Korean Aerospace Society Academic Presentation, pp. 263-264.

enables the continuous operation of space programs and the safe use of space services. Recently, the international community has focused on efforts to solve common problems such as climate change, food security, disaster, medical and education, and space debris by utilizing space technology and assets. As space technology improves the quality of life and becomes a vital factor in social and economic development, cooperation in space is increasing.⁷⁾

Scope and object of space cooperation

Before we examine the Korea-EU space cooperation, a discussion on international cooperation, in general, would be helpful. Space technology and space system development capabilities are crucial for private-led space development in the new space era. In addition, the demand for space exploration for resource acquisition and space environment research is increasing, while it has become essential for any space activities to possess space operational capabilities for the safe protection and operation of space assets. In this study, we seek to analyze joint space activities between Korea and the European Union and propose cooperative measures involving four factors: satellite navigation and satellite utilization; space exploration; space situational awareness; and human resources training in the space sector. The first is satellite navigation and satellite utilization. Europe has advanced satellite navigation capabilities thanks to the development of the Galileo satellite navigation system. As it implements the Korean Positioning System (KPS) project, Korea must work with the European Union to develop a successful Korean Satellite Navigation System as it did in 2006. Second, through space exploration and space environment research, Korea and the European Union should exchange basic space science data by conducting joint research on manned space exploration, asteroid monitoring, and space environments such as the Moon and Mars. Third, space surveillance and space tracking capabilities should be strengthened to protect space infrastructure and secure resilience. They ensure safe space service by monitoring collisions in space and ground falls of space debris. Fourth, South Korea and the European Union should jointly cultivate human resources in the space field. By strengthening human exchanges in the space sector, they should cultivate space personnel and promote cooperation in science, technology, engineering, and mathematics (STEM) education.

7) Jeong Heon-joo, Baek Yu-na and Jeong Yoon-young. "Space and international development cooperation: an exploratory analysis of the achievement of sustainable development goals using space technology." *Social science research* 33, no. 2 (2022): p. 129; McClintock, Bruce, Katie Feistel, Douglas C. Ligor, and Kathryn O'Connor, *Responsible Space Behavior for the New Space Era: Preserving the Province of Humanity*. Santa Monica, CA: RAND Corporation, 2021. <https://www.rand.org/pubs/perspectives/PEA887-2.html>(accessed on April 29, 2023); Bank of America Institute, "The New Space Era: Expansion of the Space Economy," January 27, 2023.

The scope and targets of Korea-EU space cooperation are as follows.

<Table 1> Scope and target of South Korea-EU space cooperation

Category	Area of space cooperation	Details
South Korea-EU space cooperation	Satellite Navigation and Satellite Application	Global satellite navigation service, KPS development technology cooperation, and space application
	space exploration	Activities to explore space and find resources using robot technology on the Moon and Mars
	Space Situational Awareness	Space Surveillance, space debris, Joint Response to Space Threats
	Human Resources Development in Space Technology	Exchange program, STEM field education cooperation, ESA student internships program

South Korea-EU Space Policy

EU Space Policy and Space Strategy

EU's space policy

The European Union has been active in drafting and implementing space policy, which enables the EU to set goals for job creation, investment support, and competitiveness in various industries related to space science and technology, data, and services, and to promote various projects.⁸⁾ Europe's space policy focuses on building the world's best space system and using and disseminating the data collected for the public interest. For example, the EU uses satellite images of observation satellites, uses communication satellites and sends rescue teams to the locations where natural disasters have occurred, and finds ways to use transportation and energy infrastructure more safely by improving land use in the agricultural sector. One of the notable policy goals of the EU is to provide many business opportunities to EU member states in the space data and digital technology sectors.⁹⁾ The European Space Agency (ESA) is a pan-European public institution that not only provides European member states with space industry infrastructure but also controls joint programs for research and development activities.¹⁰⁾ The European

8) Ahn Hyun-joon, "A Proposal of National Space Governance Reform according to Expansion of Space Development", *Policy Research 2022-24*, 2022, p.53

9) Ahn Hyunjoon, p. 55.

Space Agency (ESA) was established in 1975 to achieve Europe's independent space development; now it is a non-EU organization involving Canada as a partner along with 22 European countries. In Europe, commercialization activities in space are prioritized as interest in space utilization increases.

In December 2018, the European Council adopted the regulations proposed by the European Commission on the installation of the EU Space Program and Space Agency for 2021-2027. The EU Space Development Program consists of five projects in the fields of satellite navigation, earth observation, and security.¹¹⁾ In the field of satellite navigation, the Galileo Global Navigation Satellite System (GNSS), which consists of 28 satellites in Earth's orbit, and operating satellites in geostationary orbit provide the GPS error correction service.¹²⁾ The Galileo satellite was first launched in 2011 and became fully operational in 2020. The Copernicus project, which falls in the field of earth observation, aims to develop and operate earth observation satellites that observe the earth's atmosphere, marine environment, land use, and climate change.¹³⁾ It aims to develop a total of five Sentinel satellites to utilize satellite information and actively participate in international sharing and utilization of earth observation data to strengthen European space diplomacy on the international stage. The security field concerns Space Situational Awareness (SSA) capabilities and aims to develop government satellite communication networks for border and marine monitoring, disaster and crisis management, and humanitarian activities. The EU emphasizes the security aspects of space development, Europe's independent space development and use, and the paradigm shift of the space development industry involving the private sector in the new space era.

the EU's space strategy

In 2016, the European Union announced its space strategy for Europe to maximize the benefits of the space industry for economic development, secure stability and autonomy in space, and strengthen international cooperation.

In 2016, the European Commission announced Europe's first comprehensive European space strategy to respond to growing global competition in space, promote European leadership, expand its share in the space market, and seize the benefits and opportunities of space. Among the five strategic goals of the European space strategy

10) Sangwoo Shin. (2019). "The Changes of Big Science Policies: exploring value creation programmes in the US and European Space Agency," Conference of the Korean Society for Technology Innovation, (2019), p. 11.

11) Ministry of Foreign Affairs, EU plans for 2021-2027 space development, Jan. 23, 2019, https://www.mofa.go.kr/be-ko/brd/m_7570/view.do?seq=1286193 (accessed: 2023.4.29).

12) ESA, "What is Galileo?," https://www.esa.int/Applications/Navigation/Galileo/What_is_Galileo, <https://www.euspa.europa.eu/european-space/egnos/what-egnos>.

13) Europe's eyes on Earth, <https://www.copernicus.eu/en> (accessed:2023.4.29.).

were maximizing the use of space for European society and economy, fostering the European space sector globally competitively and innovatively, strengthening Europe's independent access and use of space in a secure environment, and promoting international cooperation. To achieve the fourth strategic goal, the EU engaged in space dialogue with overseas strategic partners, economic diplomacy support for overseas activities of European companies, contribution to international joint problems, and participation in protecting the space environment.¹⁴⁾

Europe announced its 2016 European Space Strategy that aimed to contribute to the establishment of high-level missions and infrastructure required by defense and security by increasing synergy in space technology, infrastructure, and services through civil-military cooperation with ESA and EDA.¹⁵⁾

Space Policy of Major European Countries

France boasts the highest budget for space programs in the European Space Agency (ESA). France presented the following four policy directions when it published its space strategy in 2012. First, it plays a leading role in the field of European space. Second, it maintains independence in space technology and space access. Third, it will accelerate the development of high-value-added satellite information utilization fields. Fourth, it would attempt ambitious space-related industrial policies. The French government and the French National Space Agency (CNES) have established plans to accelerate innovation to improve the competitiveness of the French space industry and use satellites and strengthen global warming monitoring to strengthen international cooperation and meet people's living services.¹⁶⁾

Germany's space policy had long focused on three areas: science, space transport, and infrastructure. In 2001, however, its primary focus shifted to the utilization (satellite communication and earth observation) and commercialization of the space sector were emphasized. In 2005, the German government began to show more interest in space exploration based on the technological development of its robot field. Germany's last national space strategy was announced in 2010, which aimed to develop its space industry to suit the future, was published. It proposed that the space industry should be used to not only maintain a leading position in innovation and technology but also respond to globalization, the advent of a knowledge society,

14) EUSPA, New Space Strategy for Europe launched at the European Space Expo, <https://www.gsc-europa.eu/news/new-space-strategy-for-europe-launched-at-the-european-space-expo-3>(accessed on April 28, 2023); Choe, Nammi. "Europe's Space Exploration and Korea's Space Exploration Strategy from the Perspective of Science and Technology Diplomacy." *Journal of Space Technology and Applications*. The Korean Space Science Society, September 2022, p. 197.

15) Ahn Hyunjoon, "A Proposal of National Space Governance Reform according to Expansion of Space Development," *Policy Research* 2022-24, p. 39.

16) Ministry of ICT, Space development white paper (2022), pp. 86-87.

climate change, and security threats. The German Aerospace Center (DLR) is in charge of managing the space program. DLR is pursuing R&D activities in a wide range of fields such as aerospace.¹⁷⁾

Italy announced its 2016-2025 strategic vision in 2016, strengthening its national status through international cooperation by utilizing space-based services for the space economy, contributing to the development of national science. In addition, space service was launched thanks to investment in satellite communication and satellite navigation and it is contributing greatly to the International Space Station program in the field of space exploration, a traditional area of interest.

South Korea's Space Policy and Space Power

South Korea's Space Policy

To expand private companies' participation in space development projects in the era of New Space, where the private sector leads the space industry, Korea reviewed and confirmed the 3rd Basic Plan for Space Development at the Korea-U.S. Summit in June 2021. The Yoon Suk Yeol government announced a roadmap for the future space economy with policy objectives in effect until 2045 that aimed to help Korea become a space economy powerhouse. The six major policy directions were to lead the exploration of the Moon and Mars, become a space technology powerhouse, foster the space industry, cultivate space talent, realize space security, and form international cooperation.

In December 2022, the National Space Development Committee chaired by the Prime Minister deliberated and finalized the 4th Basic Plan for Space Development Promotion, a key space development project.

The 4th Basic Plan for the Implementation of the Future Space Economy Roadmap aims to expand investment in space development and increase Korea's share of the global market from 1% to 10% by 2045. It established five long-term space development missions for the Korean space economy.¹⁸⁾

- 1) expand space exploration: The South Korean government announced its goal of landing on the moon by 2023 and landing on Mars by 2045, pushing for its own space exploration plan to expand its space economy territory. It will secure unmanned exploration capabilities independently and strategically promote manned space stations and exploration bases through international cooperation.
- 2) Complete space transport capabilities: Korea plans to complete its space

17) Ministry of ICT, Space development white paper (2022), pp. 89-90.

18) Ministry of ICT, "The 4th Basic Plan for Space Development Promotion ('23-27)," <https://www.msit.go.kr/publicinfo/view.do?sCode=user&mPid=62&mId=63&publicSeqNo=3&publicListSeqNo=3&formMode=R&referKey=3,3> (accessed on April 28, 2023).

transport capacity and build a base as a hub for space transport in Asia. It plans to develop unmanned transport capacity by improving launch capacity by 2030 and manned transport projectiles by 2045.

- 3) Create the space industry: Seoul plans to develop the space industry into a major industry to build a world-class industrial ecosystem.
- 4) Establish space security. To ensure a safe life for the people, the South Korean government plans to build a space strategy that enables international cooperation by strengthening its capacity to prepare for space risks such as space object collisions and falls and expanding space assets for national security.
- 5) Expand space science: South Korea plans to lead space research worldwide by securing research capabilities on space science and introducing long-term space science research programs.

South Korea's space power

South Korea succeeded in developing and launching the Korean-style Space Launch Vehicle Nuri, which could launch a 1.5-ton practical satellite, in June 2022. In May 2023, a next-generation small satellite manufactured in Korea will be directly mounted on the Korean space launch vehicle Nuri to carry out the third launch. It is significant as it launches a domestic practical satellite using a domestic space launch vehicle developed by South Korea.¹⁹⁾ The establishment of independent space transport capacity thanks to the reliability of South Korea's space launch vehicle production will provide space capabilities for South Korea.

South Korea has been developing and operating multi-purpose practical satellites, the earth observation satellites. Multi-purpose practical satellites are low-orbit earth observation satellites that secure various satellite data through payloads such as electronic optical cameras, image radar, and infrared cameras; their main uses are for land and marine monitoring, weather, geology, agriculture, water resources, and disaster response.²⁰⁾ In the geostationary orbit, satellites for maritime and weather observation are developed to provide services to the public sectors. The South Korean military is working on a reconnaissance satellite project to strengthen its intelligence surveillance and reconnaissance capabilities and is developing major sensors for satellites through international cooperation.

The Korea Satellite Navigation System (KPS) construction project, which will cost 3.7 trillion won, is to develop its own satellite navigation system that provides position, navigation, and time (PNT) information essential for the operation of

19) Choi Ji-won, "180kg small satellite, our technology projectile... The first step in revitalizing the domestic space industry," *Dong-A Ilbo*, 2023.4.25.,
<https://www.donga.com/news/It/article/all/20230425/118988168/1>

20) KARI, "Korea Multipurpose Satellite(Arirang)," https://www.kari.re.kr/kor/sub03_03_01.do(accessed on April 28, 2023).

national core infrastructure such as transportation, communication, and finance. Currently, South Korea relies on GPS operated by the U.S. for satellite navigation services. The KPS project aims to develop KPS satellite systems, ground systems, and user systems from 2022 to 2035 and to operate its own system by placing a total of eight satellites in orbit. If South Korea succeeds in building the KPS, it will become the seventh country in the world to have its own navigation satellite system after the U.S., Russia, the European Union, China, India, and Japan.²¹⁾ Just as 300 private companies participated in the Nuri development project to create an ecosystem for the space industry and boost technology, the KPS project will provide a valuable opportunity for domestic space companies to secure technology and gain satellite launch experience.

In response to the new space era, South Korea decided to establish the National Aeronautics and Space Administration to carry out the country's leading mission to develop the space economy through space development. President Yoon Suk Yeol visited NASA on April 25, 2023, to establish a NASA-like Korea Aerospace Agency (KASA) that would lead the Korean space economy and emphasize the importance of Korea-U.S. space cooperation in the future. In addition, the Ministry of Science and ICT and NASA signed a joint statement between South Korea and the U.S. on cooperation in space exploration and space science. South Korea will strengthen cooperation with the United States to collaborate on joint tasks in areas such as lunar exploration programs, satellite navigation systems, and space exploration.²²⁾ The South Korea-U.S. space technology alliance agreement will serve as an invaluable opportunity for South Korea's future development in the space sector.²³⁾

For South Korea to succeed in space development, it needs to expedite the special law of the National Aeronautics and Space Administration, secure a sufficient budget, create private funds, develop core technologies, and create a private space ecosystem.²⁴⁾

The U.S. has the largest budget of \$61,967 million among all countries' space budgets, including China's at \$11,935 million, France's at \$4,204 million, Germany's at \$2,527 million, and Italy's at \$1,736 million. Korea's budget of \$7.24 million is far short of the space budget when compared to space-advanced countries. It is imperative that the South Korean government increase the budget and implement the space power generation plan to improve Korea's national space technology.

21) Ko Jae-won, "Development of the K Satellite Navigation System 'Long March'" *Dong-A Science*, <https://www.dongascience.com/news.php?idx=58525> (accessed on April 28, 2023).

22) Jeon Ju-young, "Finding NASA, expanding the space alliance between the two countries into space security," *Dong-A Ilbo*, 2023.4.27., <https://www.donga.com/news/Politics/article/all/20230427/119028304/1>

23) Kim Min-seok, "The urgency of the Korea-U.S. Space Alliance and the Space Agency Act," *Munhwa Ilbo*, 2023.4.28., <https://www.munhwa.com/news/view.html?no=2023042801033311000002>.

24) Kim Min Seok, 2023.

2011 and 2016 to collaborate on the European Space Agency's launch tracking operation and promoted Soyuz and Vega launch tracking cooperation, using the Korea Aerospace Research Institute's Jeju tracking station. KARI and ESA continue to hold bilateral meetings to facilitate exchanges between the two agencies, including signing business agreements to promote cooperation in the space sector.

France is the first country in Europe to launch a national space program. Its space industry has a huge influence on the entire European space market. After signing a memorandum of understanding with the French National Space Research Center (CNES) in 1990, KARI co-developed a Chollian satellite, which would provide weather and maritime information in geostationary orbit, developed parts of the Earth observation satellite, and cooperated with the CNES on the Naro Space Center launch pad. It also signed an MOU with the International Space University (ISU) to promote international space exchange programs.

Since the 2000s, South Korea has been working closely with the German Aerospace Center (DLR) on satellite components such as multi-purpose practical satellite optical payload parts and SAR radar payload parts. It also cooperated with the DLR to install and operate multi-purpose practical satellites in Germany for overseas ground stations.

In the defense sector, South Korea is developing payload sensors for the reconnaissance satellite business with Italy while holding a defense space cooperation meeting between Korea and France to exchange professional personnel and respond to space threats.

South Korea and Europe have participated in the International Astronautical Congress (IAC) to continue cooperation in space and space training programs between the two countries through the International Space Education Board. For Korea to strengthen space cooperation with the EU, it is imperative to reinforce space surveillance activities such as sharing space policy information, expanding joint research cooperation on space exploration, and responding to threats in space.

South Korea-EU Space Cooperation Task and Strategy

The potential areas for the South Korea-European Union space cooperation include satellite navigation and satellite utilization, space exploration and space environment research, and space security and space situational awareness. Space cooperation between South Korea and the EU is very essential for South Korea's future space science and technology and space power.

Satellite Navigation and Satellite Application

Satellite utilization offers greater economic value than satellite manufacturing and projectile services. Recently, international cooperation concerning satellite utilization, such as artificial intelligence technology, global satellite Internet

network construction projects, and satellite data sharing, has been increasing. Since South Korea has excellent science and technology ability to predict climate change and disasters through satellite image analysis, such as artificial intelligence and big data analysis, it can enhance cooperation with the European Union by promoting more investment and exchanges in satellite utilization.

Space exploration and space observation research

1) Space exploration program

Through cooperation on space exploration and space environment research, South Korea and the EU conduct joint research on unmanned space exploration, asteroid monitoring, and space environment with attractions such as the Moon and Mars and share their findings with each other. South Korea is a member of the Artemis program, a manned lunar exploration project led by the United States, and is successfully operating a lunar orbiter. In April 2023, the Korea Institute of Geoscience and Mineral Resources (KIGAM) and the European Space Resources Innovation Center (ESRIC) agreed to conduct cooperative research on the utilization of resources on the Moon.²⁶⁾

2) Space observation research

Solar environmental research and lunar science research are fundamental fields of astronomy. The European Space Agency, in collaboration with NASA in the United States, conducts joint research on astronomical observations and the formation of space origins and planets through the James Webb Space Telescope program.²⁷⁾ Since the Korea Astronomy and Space Science Institute (KASI) currently works with NASA on solar physics research and engages in joint overseas research such as asteroid impact test observation, it can form collaborative relationships with the EU on research concerning space astronomy.

Space Situational Awareness and Ensuring Safe Space Activity

The European Union carries out a space situation recognition project to monitor and track artifacts and satellite debris in outer space of the Earth. Recently, China and Russia have been doubling down their response to space threat activities.²⁸⁾ South Korea maintains space cooperation concerning various

26) KIGAM, “ESRIC-KIGAM Moon resources cooperation,” April 20, 2023, https://www.kigam.re.kr/gallery.es?mid=a10703010000&bid=0003&act=view&list_no=3808

27) ESA, https://www.esa.int/Science_Exploration/Space_Science/Webb(accessed on April 30, 2023).

28) China Aerospace Studies Institute, “China-Russia Space Cooperation: The Strategic, Military, Diplomatic, and Economic Implications of a Growing Relationship,” May 8, 2023, <https://www.airuniversity.af.edu/CASI/Display/Article/3373101/china-russia-space-cooperation-the-strategic-military-diplomatic-and-economic-i/>(accessed on April 28, 2023).

space situations; for example, it shares information related to space threats through space policy dialogue with the U.S. and space situational awareness (SSA). To build joint response capabilities related to space threats, based on its experience of joint space operations with the U.S. military, the South Korean military needs to participate in joint training with European countries using reconnaissance satellites in the future.

Human Resources Development in Space

Space is a field that requires advanced science and technology capabilities. Training human resources with advanced technology capabilities such as artificial intelligence, software, and autonomous driving is essential for successful space activities. If Korean students with excellent technological skills participate in the international exchange program in the space field, Korea's international status will be enhanced. It will contribute to fostering Korean space science and technology talent by supporting Korean students' participation in international exchange programs such as ESA or internships in the European Union. With increasing global interest in Korean culture in recent years, developing and implementing space education programs incorporating Korean cultural elements into space science and technology will enhance Korean students' international competitiveness and promote international exchanges related to space education.

Conclusion

Space development cooperation between South Korea and the European Union constitutes a significant part of South Korea's space development history. Continuous technical cooperation and international exchanges with European countries helped South Korea acquire satellite and rocket technologies. Since space technology concerns national security and is advanced science and technology, it is understandable that one may be hesitant to transfer technology to other countries. To become a space economy powerhouse, Korea should invest in space development substantially and advance space technology through international exchange programs, cooperation with advanced space powerhouses, and active participation in international collaborative space programs. To begin their collaborative relations in space science and technology, South Korea and the European Union can identify specific fields for their cooperation, such as joint response to space threats, joint space exploration to secure future resources, and satellite aviation systems to improve people's life. Korea should analyze European countries' efforts and policies to maximize space use for economic development and establish and implement space cooperation development plans between Korea and the European Union.

South Korea successfully carried out satellite projects thanks to international cooperation with European countries. After the development of the Korea multi-purpose satellite 1 helped by U.S. companies, cooperation with European countries has been expanded in satellite development, improving the performance of the satellite body and payload. In addition, by using Europe's Ariane space launch vehicle to launch satellite launches, South Korea was able to solidify its status as a rightful partner of European countries in space science and technology.

The European Union strives to advance its economy, and enhance its space power via international cooperation and improved personnel training in the space sector. To strengthen space cooperation between Korea and the European Union, this study proposes the following policy suggestions.

First, space technology development and international cooperation should be strengthened to respond to changes in the global space development environment and to realize South Korea's space economy in the future. As a space-advanced country, the European Union plays a significant role in the international space market. The South Korea-EU space cooperation will help South Korea to build its space economy and emerge as an advanced space country. Space will be pivotal for South Korea as a future source of economic growth.

Second, it is imperative for South Korea to closely analyze the international space development situation, propose space policies similar to Europe's space strategy and space program, and execute space development plans. Europe's space programs seek to serve its citizens and boost its economy. While analyzing Europe's space strategy, South Korea should identify ways to strengthen cooperation with the European Union. It should also be able to model South Korea's space policy on European space programs and implement space development plans.

Third, international cooperation in space activities will allow the recruitment of excellent space experts and foster future talent in space science and technology. Space activities do not simply affect the national economy but can cultivate South Korea's space personnel and contribute to fostering future national talent through international exchanges. South Korea should pay attention to space education and training as part of space activities that can cultivate space science talent especially as they collaborate with those from other countries.

Fourth, a joint response to the recent space threats from Russia and China could be a way to strengthen cooperation in the defense sector between South Korea and European countries. While international cooperation has been thriving in the private sector, it is rare in the defense sector. As the EU plans to strengthen space security cooperation among European countries in the defense sector and enhance space surveillance and object tracking capabilities to protect and secure space infrastructure, South Korea should promote itself as a rightful partner in space security.

Fifth, by establishing and operating the Korea Aerospace Agency (KASA),

South Korea should manage its space activities and promote cooperation with the space agencies of space-advanced countries. In 2023, a special law concerning the establishment of the KASA was enacted. The KASA will play a key role in revitalizing space cooperation between the EU and South Korea and present a future vision.

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Three Track Approaches to Verify and Destruct North Korea's Biological Weapons

Ki-Chul Park

Abstract

Biological warfare agents (BWA) are highly potent substances that can cause harm when inhaled or ingested. These agents can be living organisms or toxic substances created by them. Due to their potency, BW agents can be up to 108 times stronger than the most potent chemical warfare agents (CWA). The primary delivery method for BW agents is through the air as an aerosol, which can spread through the wind. Biological agents can take several hours to take effect, and the effects of biological diseases may not manifest for days or even weeks. North Korea is believed to have an active biological weapons program and has been developing and stockpiling various biological agents, including anthrax, smallpox, botulinum toxin, and plague. North Korea's pursuit of biological weapons is a significant concern for the international community, and efforts to prevent the proliferation of these weapons have been ongoing for many years. This study aims to examine the potential risks of North Korean biological warfare and the measures taken by ROK-U.S. to mitigate these dangers. However, North Korea's deliberate secrecy about its biological weapons program makes it challenging to draw definitive conclusions on this subject. Nonetheless, since biological weapons potentially benefit North Korea, the country is very likely to possess them and thus pose a biological warfare threat. Responding to North Korea's biological weapons threats requires a comprehensive approach that involves diplomacy, intelligence, military, preparedness, and international cooperation. Three distinct approaches have been suggested to verify and dismantle North Korea's biological weapons program. They are contingent on feasible scenarios for verifying and destroying its capability. These scenarios depend on the stability of the Kim Jong-Un (KJU) regime. In addition, diplomatic efforts, intelligence monitoring, effective countermeasures, and citizen education and preparedness are all necessary components of a comprehensive response.

Keywords: North Korea, Biological Weapons Threats, Kim Jong-Un regime, BWC.

INTRODUCTION

Biological warfare agents (BWA) refer to living organisms or toxic substances that are produced by living organisms, such as toxins. The main worry is with the presence of bacteria and viruses that have an extremely high level of potency, ranging from 102 to 108 times stronger than the most potent Chemical warfare agents (CWA), which are nerve agents. This increased strength often results from the organisms' ability to reproduce within the body (USAMRIID 2020).

Generally, BWA is dispersed in the air as an aerosol, which can be transported by wind. Once on the ground, the agents become less dangerous but can still be re-aerosolized by movement in the area. Unlike chemical warfare agents (CWA), BWAs generally have little effect on the skin and must be inhaled or ingested to cause harm, although they can also penetrate the body through contact with hands and eyes. Most BWAs quickly die or become inactive in the environment, but some exceptions exist. Unlike CWA, which can cause rapid fatalities, biological toxins can take several hours to take effect and may not manifest for days or weeks. Due to their fragility, BWAs are most likely to be delivered through sprayers on the ground or mounted on drones. Explosive munitions are less effective because they can destroy much of the live agent, although the Soviet Union had planned to use them (Windrem 2001). The aim of biological weapon attacks may not necessarily be to cause fatalities but to disable victims for prolonged periods, which could reduce the likelihood of a severe retaliatory response such as the use of nuclear weapons. Biological agents can be contagious or non-contagious; the former carries a greater impact as the disease can spread far beyond the site under attack. However, using contagious agents could be risky because they could spreading back to the attacker's troops or country. Non-contagious agents would not pose this risk and would limit their impact within the targeted area.

North Korea is believed to have an active biological weapons program, although the extent of its capabilities and the current status of the program are uncertain. The North Korean government has been suspected of pursuing biological weapons for many years, and there have been multiple reports of covert activities related to biological weapons development in the country. According to various sources, North Korea has been producing and stockpiling different biological agents, including anthrax, smallpox, botulinum toxin, and plague. It is also suspected that North Korea has been researching and developing new biological agents that could potentially be used as weapons.

The international community is concerned that North Korea could employ biological weapons in various scenarios, including retaliation in the event of a conflict, covert assassination or sabotage, or terrorist attacks against other countries. North Korea's pursuit of biological weapons is a cause for significant

concern, and efforts to prevent the proliferation of these weapons have been ongoing for years. The United States and other nations have imposed sanctions on North Korea in an attempt to deter its weapons programs, and international organizations like the United Nations have also worked to limit the spread of biological weapons. The use of biological weapons constitutes an extraordinary occurrence known as an X-event. X-events are difficult to predict and improbable to take place, yet when they do manifest, they inflict substantial harm that surpasses the means of a single nation to bear. Information concerning North Korea's biological warfare program is limited and inaccessible, but it is crucial to acknowledge it as a substantial menace and to be thoroughly prepared to tackle it.

This study aims to examine the potential risks of North Korean biological warfare, as well as the measures taken by ROK-U.S. to mitigate these dangers. However, North Korea has deliberately kept any detailed information about its biological weapons from ROK-U.S., making it difficult to draw definitive conclusions about the subject. Nonetheless, since biological weapons potentially benefit North Korea, the country is likely to possess them and, thus, pose a biological warfare threat. North Korea's biological threats necessitate a multifaceted approach. Diplomatic efforts should be strengthened through sanctions, negotiations, and incentives. Intelligence agencies should monitor North Korea's biological weapons program to understand its capabilities and intentions. Effective countermeasures should be developed and deployed, including medical and physical countermeasures. Governments should educate and prepare their citizens for a biological attack, and the international community should work together to prevent the proliferation of biological weapons. Responding to North Korea's biological weapons threats requires a comprehensive approach that involves diplomacy, intelligence, military, preparedness, and international cooperation.

In addition, I suggest three distinct approaches to verify and dismantle North Korea's biological weapons program; they are contingent on feasible scenarios for verifying and destroying its capability. These scenarios depend on the stability of the Kim Jong-Un (KJU) regime. The first scenario assumes regime stability and proposes that the U.S. should support the Biological Weapons Convention (BWC) to bolster the regime's power. The second scenario, also assuming regime stability, suggests that a harmonious relationship between North and South Korea could be fostered. The third scenario, characterized by regime instability or sudden change, would require a different approach.¹⁾

1) Further theoretical discussion on WMD regime effectiveness can be found at "Park, Ki Chul, 2021. "An Inquiry for Weapons of Mass Destruction Regime Effectiveness: Great Power's Commitment and Implications for North Korea's Biological Weapons Threats", Korea University dissertation, February."

NORTH KOREA'S BIOLOGICAL WARFARE THREATS

North Korea Biological Weapons Program

Despite the lack of concrete information, there is consensus among experts that North Korea's pursuit of biological weapons is a cause for concern. The potential use of these weapons by North Korea could have devastating consequences, given the highly contagious nature of some biological agents and the difficulty in containing their spread once released. The international community has taken steps to address this threat, including imposing sanctions on North Korea and engaging in diplomatic efforts to prevent the proliferation of biological weapons. However, given the challenges in monitoring North Korea's military activities, it remains difficult to determine the exact nature and extent of their bioweapons program (Harris 2019).

Former Russian Prime Minister Yevgeny Primakov served as director of the Federal Security Bureau (FSB) in 1993. His report, titled "New challenges after the cold war: WMD proliferation," described North Korea's biological weapons program. According to the report, North Korea intends to develop biological weapons using anthrax, cholera, plague, and smallpox. Pyongyang Medical College often collaborates with unknown medical research institutes. Live agents are also used in experiments on the veiled islands (Farkas 1999).

In 2015, the U.S. Department of Defense's report on North Korea raised the issue of military doctrine, saying that the North may consider the use of biological weapons an option. But the report made no mention of actual work on these weapons, noting only that North Korea was continuing to develop its capabilities for biological R&D. The 2017 report was the same with one important exception. After noting that North Korea's R&D capabilities could support a biological warfare program, it added that most aspects of biological weapons research were inherently dual-use, which means they could be used to develop both medical countermeasures and biological warfare agents (U.S. OSD 2015/2017).

Different views are presented by various sources within the U.S. and South Korean governments regarding North Korea's biological weapons program. While some analysts assert that there is no publicly available evidence to support the existence of a North Korean biological weapons program, other reports indicate that North Korea possesses the capability to produce and distribute biological weapons. According to the 2020 South Korean Defense White Paper and the 2022 Annual Threat Assessment by the U.S. Director of National Intelligence, North Korea was believed to have a biological weapons program and suspected of possessing a variety of BWAs, including anthrax, smallpox, botulinum toxin, Korean hemorrhagic fever (KHF), plague, yellow fever, typhoid fever, dysentery, brucellosis, cholera, T-2 mycotoxin, staphylococcal enterotoxin B (SEB), typhus, and tularemia. It is improbable that North Korea has developed all 14 agents, particularly, since some of them, such as cholera and dysentery, would be less effective in modern countries like

South Korea. This article focuses on two BWAs, anthrax and KHF, as they are the most probable agents developed by North Korea, based on the evidence uncovered in recent decades. North Korea has reportedly cultured significant quantities of the KHF virus for vaccine production, making it a particularly useful agent in the Korean context since it occurs naturally in Korea. (Bennett 2022, 27)

<Table 1> Characteristics of Some Potential North Korea Biological Weapons

Biological Weapon	Cases in 2021	Incubation Period	Duration of Illness	Untreated Lethality	Contagious	Aerosol Persistence
Anthrax	0	1–6 days	3–5 days	High	No	High
Botulinum toxin	0	12 h–5 d	1–3 d if lethal, months otherwise	High	No	Moderate
Brucellosis	8	5–60 d	Weeks to months	< 5%	No	Moderate
KHF	260	4–42 days	Weeks to months	5–15%	Rare	Low
Pneumonic Plague	0	1–7 days	1–6 days	High	Moderate	Low
SEB	0	3–12 hours	1–2 weeks ^a	< 1%	No	Low
Smallpox	0	7–17 days	4 weeks	High to moderate	High	Moderate
Q Fever	48	7–41 days	2–14 days	Very low	Rare	High
Ricin	0	18–24 hours	Days	High	No	Low
Tularemia	0	1–21 days	2+ weeks	Moderate	No	Low

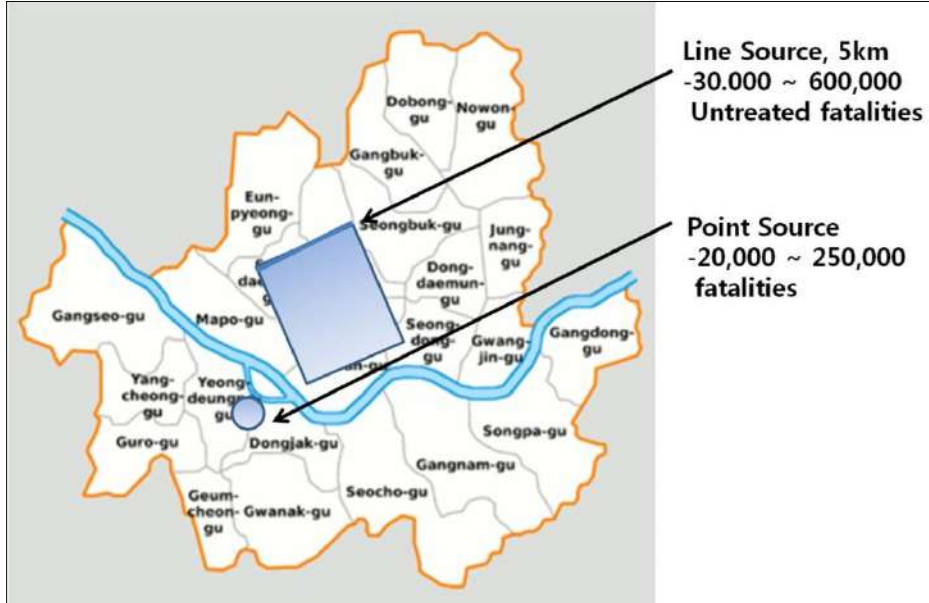
Source: U.S Army Medical Research Institute of Infectious Disease (USAMRIID)'s Medical Management of Biological Casualties Handbook, 9th ed., September 2020

Kim Jong-un's 2015 tour of a biopesticide factory in North Korea has raised suspicions that anthrax could be part of the country's biological weapons program. During the visit, Kim inspected *Bacillus thuringiensis* (Bt), which is used to produce biopesticides that can be used to eliminate insect pests over vast areas while being harmless to humans and animals. Although Bt is different from anthrax, they belong to the same genus, and Bt uses the equipment that can manufacture anthrax. Iraq and the Soviet Union had previously used Bt production to mask anthrax production. Even though Kim did not wear any protective gear during the factory visit, which may indicate that the plant was not producing anthrax, there is still concern that the plant could start producing anthrax upon Kim Jong-un's orders at any time (Hanham 2015).

Biological Weapons Simulation and Physical and Social Effects

Bruce W. Bennett, a defense analyst at the RAND, warns North Korea's potential use of biological weapons against both military and civilian targets. A biological weapon would probably be delivered as a dispersed aerosol that the wind would carry. If people are not wearing some form of protection or are not physically in a place that protects them from exposure, they will be exposed downwind of the release location (See Figure 1) (Bennet 2011).

<Figure 1> Potential Effects of 10kgs of Anthrax on Seoul



Source: Proliferation of Weapons Mass Destruction: Assessing the Risks, the U.S. Congress Office of Technology Assessment August 1993.

Some biological weapons like smallpox are contagious. Its incubation and effect periods are long, and its mortality rate is fairly high if untreated. Vaccination can prevent diseases like smallpox from spreading. Many countries achieved herd immunity levels of vaccination during the eradication of smallpox. Since the 1970s, however, almost no one in the world has been vaccinated. As a precaution against North Korea's potential use of smallpox, the Korea Centers for Disease Control (KCDC) prepared seven million doses of the smallpox vaccine, which is not enough to cover the entire country. It has recently been reported that South Korea's smallpox vaccines have either expired or failed a toxicity test (Lee 2016).

Biological weapons would not only result in casualties but also affect the following four areas (Bennett 2011).

A. Destruction of Infrastructure

Following the anthrax attacks in the US in 2001, the facilities where anthrax had been spread remained contaminated for several months to years before they were fully decontaminated and deemed safe to use. While many biological weapons degrade quickly after release, certain ones such as anthrax can persist for an indefinite period of time.

B. Healthcare System

The healthcare system can become overwhelmed if a large number of people become ill from biological weapons, which can divert individuals who are not sick from their usual activities to help care for their ill family members or friends. The "worried well" population, which perceives themselves as infected when they are not, may seek medical attention. This phenomenon was observed after the terrorist use of Sarin (GB) in Tokyo in 1995, where the number of people seeking hospital care due to anxiety and physical symptoms was three times higher than the number of individuals who actually had physical symptoms of chemical exposure. (Meyer 2003).

C. Biological Weapon Protection

When the symptoms of a biological weapon start to show, people will take steps to protect themselves, such as wearing surgical masks or P-95 respirators. However, these measures can limit people's ability to perform physical activities and may affect their overall behavior.

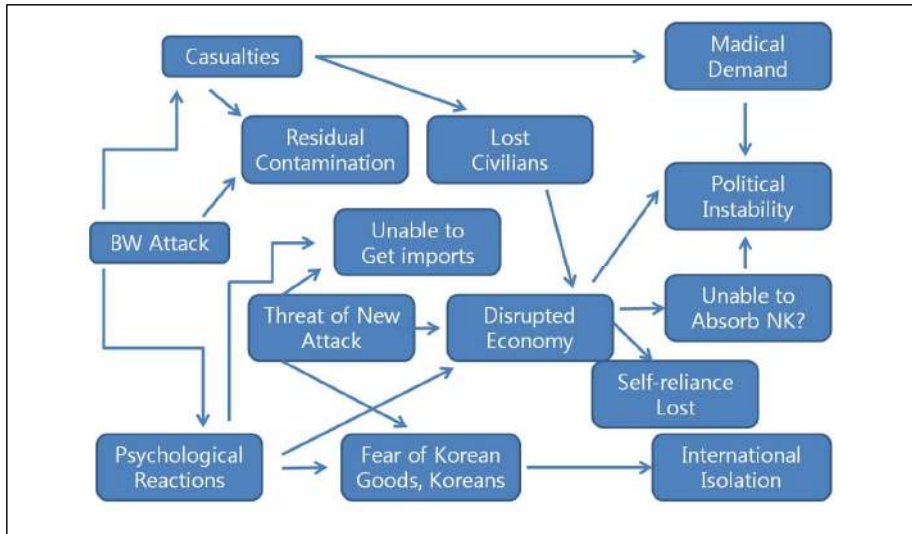
D. Psychological Reaction

The use of biological weapons can trigger strong psychological reactions in some individuals, exacerbating the "worried well" issue. A case in point is the 1994 outbreak of natural plague in Surat, India, where 600,000 people fled the city in response to 5,000 reported cases, even though only 167 cases were actually confirmed. (Ramalingaswami 2001, 29-30).

Biological weapons can have strategic impacts that go beyond direct human and infrastructure losses, as shown in Figure 2. The economic impact of biological contamination, including loss of civilian life and infrastructure, can be significant. If contagious biological weapons are used, trading partners may refuse to send goods to or accept goods from the affected country due to fears of contamination. There may also be concerns about additional biological weapon attacks, potentially targeting countries that provided assistance to the country under attack. The country affected by biological weapons may also face international isolation, as seen in the 1972 smallpox outbreak in Kosovo where neighboring nations closed their borders with Yugoslavia (Henderson 1998, 490). The use of biological weapons could lead to internal unrest, as the healthcare system and other resources may not be sufficient to meet the demands of scores of sick people. This could result in the military being diverted from their usual duties to maintain order and impose quarantine and vaccination requirements. In the case of South Korea, such internal problems could prevent them from carrying out a counteroffensive against North Korea or dealing

with a failed government in North Korea. It is so because they may be fully occupied with internal problems and lack the economic resources needed for unification.

<Figure 2> Potential Strategic Impacts of Biological Weapon Use



Source: Bruce W. Bennett, "The Challenge of North Korea Biological Weapons", Presentation at 16th Hwarangdae Symposium, October 26, 2011

The terrorist attacks on September 11, 2001, on U.S. soil caused a relatively small loss of life, less than 0.002 percent of the population, while costing the United States approximately 1 to 5 percent of its gross domestic product. This example highlights that the economic impact of an incident can be much greater than the impact on the number of casualties. A biological attack in South Korea that could affect 100,000 people, or about 0.2 percent of the population, would have significant economic implications (Bennett 2011).

According to a report issued by a U.S. official in August 2011, North Korea might still consider using biological weapons as a military option and has been actively seeking to acquire specialized equipment, materials, and expertise that could support the development of biological weapons. Although North Korea has signed the Biological Weapons Convention (BWC), it has not revealed any information about its biological research and development activities, which is required as part of confidence-building measures (CBMs) under the BWC (US Department of State 2011).

Recently a North Korean government official declared that they would take extraordinary action to attack South Korea in a revolutionary way that has never been

imagined before (Daily Korea Times 2016). What does this provocative rhetoric implicate? What is the revolutionary way that has never been used? There is no way to know whether these threats are just empty words designed to scare Seoul or would actually be carried out. If Pyongyang were serious, next-generation warfare would be biological. Strategically, there is a belief that North Korea is clandestinely dispersing biological agents during the early stages of a conflict, which would result in widespread societal chaos. There is a challenge in distinguishing between an intentional biological attack and the emergence of a naturally occurring infectious disease, which makes it likely that the biological attack is undertaken as a means to mask the real intention. From an operational standpoint, there is a potential for North Korea to resort to a smallpox attack as a desperate measure when the war takes a turn for the worse or the Kim Jong-un regime is on the brink of collapse. In fact, "Able Response," the ROK-US Combined tabletop exercise, has been conducted based on strategic and operational scenarios since 2011.²⁾

THREE TRACK APPROACHES

The U.S. government officials now admit that the CIA's initial assessment of North Korea's leader Kim Jong-un was a failure. They believed he was more interested in reforming its economy than pursuing his father's "military first" policy. However, Kim Jong-un has continued to increase tension on the Korean Peninsula since taking power by making threats of unexpected strikes against South Korea (Sanger 2013).

Different interpretations exist within the US government regarding North Korea's leader, Kim Jong-un. Admiral Samuel J. Locklear III, head of the Pacific Command, described him as impetuous and more unpredictable than his father during his testimony to the Senate Armed Services Committee. However, Lieutenant General Michael T. Flynn, Director of the Defense Intelligence Agency, characterized Kim as a charismatic leader who understands real politics and is firmly in control, acknowledging that he cannot survive a full-scale war. Kim's government has also played a complex game with American intelligence agencies.

The international community holds optimistic expectations for a policy that strengthens the Biological Weapons Convention (BWC) and bolsters the implementation of the international framework. This aligns with the continuity between the foreign policies of the Biden and Obama administrations. However, it is worth acknowledging that the BWC significantly limits the United States' ability to

2) Able Response, a collaborative effort between South Korea and the US aiming to combat biological threats, also contributed to advancing the bio defense project. This joint exercise took place between 2011 and 2016, and it was later substituted by a tabletop training session known as "Adaptive Shield."

pursue research related to biological weapons that intends to safeguard and defend the domestic pharmaceutical industry. Consequently, it is somewhat idealistic to anticipate that the BWC would verify and dismantle North Korea's biological weapons capabilities effectively.

To respond to North Korea's threats with biological weapons, Seoul should consider the multi-track strategy of collaborating with the Biden administration. For the possible scenarios about Pyongyang's actions, I propose the following three track approaches that will verify and destruct North Korean bio threats.

Track I. Diplomatic efforts to enhance BWC effectiveness and cooperate with E.U. and UNSCR: Kim Jong-Un's stable regime and Great Power changing directions to support BWC.

Professor Bruce Cumings emphasized the significance of understanding North Korea's historical background to contextualize current developments properly. He pointed out that North Korea's history as a monarchy and the power transition that followed Kim Il-Sung's death are important factors to consider. Cumings noted that there was minimal disruption when Kim Il-sung died, highlighting the stability of the regime, which contradicts the commonly held belief that the regime is volatile. Cumings further argued that Kim Jong-un's leadership style is similar to that of Kim Il-sung and that he will overshadow Kim Jong-il, whose reign was the worst in North Korean history. Overall, Cumings' analysis suggests that Kim Jong-un's leadership is more stable than commonly thought (Kassam 2012). If Kim Jong-Un's regime maintains its stability and continues to manage the crisis successfully and also the Washington changes its policy direction in support of BWC, then diplomatic efforts are required to eliminate the North's biological weapons threat.

In December 2009, the US government unveiled a new strategy for the Biological Weapons Convention (BWC). Speaking at a meeting of the BWC's member states in Geneva, Switzerland, Under Secretary of State Ellen Tauscher emphasized that President Obama understood the potential danger of a biological attack and its potential consequences, which could be as severe as a nuclear attack. The Obama administration developed a strategy aiming at advancing the objectives of the BWC. However, the US government did not endorse the establishment of an international monitoring system that would verify the BWC member states' compliance with the treaty (Matishak 2009). The strategy and posture of the U.S. on the BWC would not change in the Trump administration, which insisted on "America First" to protect the pharmaceutical and bio-industries for the national interest. Even the Biden administration declared to boost the goals of the BWC, but the likelihood that the U.S. Senate would ratify the verification protocol is very low because pharmaceutical and bio-industries wield a strong influence on the Senate not to get the protocol ratified. In short, if Kim Jong-un's regime were stable and the U.S. boosted the compliance level for the BWC without ratification of the verification

protocol, Seoul should focus on diplomatic efforts to enhance the transparency of CBMs and NIMs of Pyongyang by cooperating with other international organizations such as E.U. and UNSCR Committee.

The European Union (E.U.) provides support to the BWC through a Council Decision called the BWC Action and previous E.U. Joint Actions. These projects with a specific time limit require coordinated action from the member states of the European Union, using resources such as human and financial resources, equipment, and expertise to achieve the specific objectives set by the E.U. Council. The member states are committed to the positions they adopt and the actions they take as part of these projects.

The United Nations Office for Disarmament Affairs (UNODA) in Geneva is responsible for implementing the BWC Action, which has three major projects aiming at supporting the BWC and the work of the BWC Implementation Support Unit (ISU). These projects include promoting universality and national implementation, building confidence in compliance, strengthening international cooperation, and encouraging discussion on the future of the BWC. The previous E.U. Joint Action, which focused on promoting universalization, national implementation, and the submission of Confidence-Building Measures (CBMs), was also implemented by the Geneva Branch of UNODA. The first E.U. Joint Action was implemented by the Graduate Institute of International Studies in Geneva and focused on universalization and national implementation. Through these projects, E.U. Member States mobilize resources and work together to achieve specific objectives set by the E.U. Council, committing to the positions they adopt and their activities.

The European Security Strategy of 12 December 2003 identified the proliferation of WMD as one of the main threats to our collective security. Despite the successes of international treaties and export control regimes to slow the spread of WMD, the threat only continues to grow as advances in biological sciences and technology enable easier production of more menacing biological agents. The E.U. is a strong supporter of all multilateral agreements that aim to disarm and prevent the proliferation of weapons of mass destruction, including the BWC. They have developed a strategy against the proliferation of such weapons, based on effective multilateralism, prevention, and cooperation. The E.U. is implementing measures listed in BWC's Chapter III to reinforce and implement the BWC, with a particular focus on universalization. The E.U. adopted an action plan on biological and toxin weapons on 20 March 2006, which aimed to efficiently utilize Confidence-Building Measures (CBMs). E.U. member states agreed to submit their CBMs annually and also provided a list of relevant experts and laboratories to the UN Secretary-General to facilitate investigations in case of alleged use of chemical and biological weapons.

In a report on the implementation of the European Security Strategy dated 11 December 2008, it was noted that the risk of proliferation of weapons of mass

destruction by both states and terrorists had increased since 2003, putting pressure on the multilateral framework. The report stressed the importance of continued efforts to prevent proliferation through UN and multilateral agreements, which act as key players, and work with third countries and regional organizations to enhance their capabilities to prevent proliferation. It also highlighted the need for more work on specific issues, including E.U. support for measures related to biosafety and biosecurity. At the BWC Seventh Review Conference held in December 2011, the E.U. had identified three priorities for reviewing the BWC: promoting universalization, supporting national implementation, and building confidence in compliance. North Korea became a signatory to the Biological and Toxin Weapons Convention (BWC) in 1987, but it only submitted one Confidence-Building Measure (CBM) report in 1990. North Korea has not fulfilled its obligation to provide additional CBM reports or any information on its National Implementation Measures (NIMs). The BWC's Article IV requires each State Party to take necessary measures to prevent and prohibit the development, production, stockpiling, acquisition, retention, transfer, or use of biological weapons by anyone under its jurisdiction. State Parties are also required to prevent and prohibit the encouragement, incitement, or assistance of others in any of these prohibited activities.

Track II. Bilateral Treaty (Wyoming Model): Kim Jong-un's stable regime and the betterment of the relationship between the two Koreas.

In the assessment of a former North Korean intelligence official, Dr. Suh Hoon, Kim Jong-Un's regime in North Korea appears to be stable and is expected to remain in power for the foreseeable future, despite facing increased international sanctions. As an expert on North Korean leadership, Dr. Suh Hoon believes that the regime is able to maintain control over all segments of society, eliminating potential political threats. Additionally, there are no visible alternative forces within the country that could ally themselves with outsiders (Voice of America 2016).

If Kim Jong-Un's regime were stable and South Korea attempted to resume dialogue with North Korea, a direct bilateral treaty could be a potential solution to address North Korea's biological weapons threat. The 1989 Memorandum of Understanding (MOU) between the United States and the Soviet Union, also known as the Wyoming MOU, aimed to support the Chemical Weapons Convention (CWC) negotiations through data exchanges and verification experiments, which have since been completed. In 1990, the U.S. and the Soviet Union signed the Bilateral Destruction Agreement (BDA), which prohibited chemical weapons production and required both countries to destroy most of their chemical weapon capability. By signing the BDA, the U.S. and the Soviet Union showed their willingness to halt production and initiate the destruction of chemical weapons without waiting for agreement on the CWC. Although the CWC has entered into force, a verification

protocol for the BDA has not been completed.

The BDA would require both participating countries to provide declarations regarding their relevant activities and facilities initially and annually. The initial declaration would contain information about any offensive weapon programs, while the annual declaration would cover four categories: (a) activities and facilities involved in national defense against biological or toxin weapons; (b) facilities designed to prevent the spread of biological agents; (c) facilities involved in working with specific agents or toxins; and (d) facilities that produce biologically based products. Randomly selected transparency visits would ensure the accuracy of declarations and promote transparency. A declaration clarification procedure would resolve any issues in declarations, including the omission of a facility that meets declaration criteria. The protocol includes mechanisms for consultation, clarification, and cooperation between the state parties. The Executive Commission would investigate any alleged use of biological weapons, with an investigation team having access to relevant personnel, documents, records, and equipment. The organization would consist of a Conference of States Parties, an Executive Commission, and a Technical Secretariat to facilitate the implementation of the BDA (Voice of America 2016).

Track III. Challenge Investigation (UNSCOM / UNMOVIC Model): Kim Jong-Un's unstable regime, sudden change of Pyongyang, and finding evidence of the intention of using biological weapons.

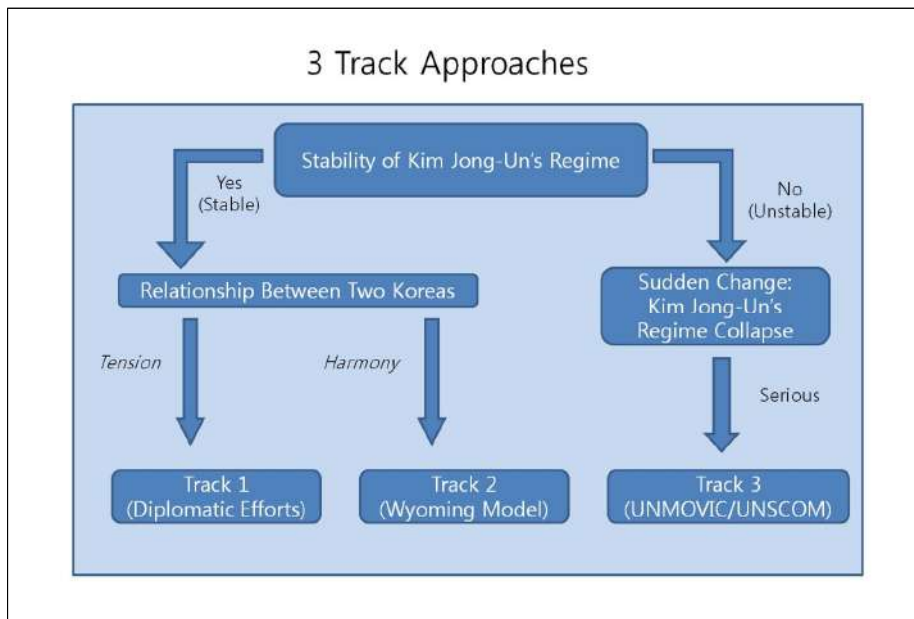
As per an article in the Foreign Policy Journal on August 18, 2015, there is a chance that Pyongyang could face a conflict similar to that of Syria, which would lead to immense chaos in the Korean peninsula and East Asia. As Kim Jong-Un continued to purge generals and political advisers, a high-ranking official may attempt a coup d'état to prevent their own execution, possibly by anti-aircraft fire. Such an event, along with a popular revolt, would not immediately end Kim's government but, instead, lead to a prolonged and extremely deadly conflict that would destabilize the region and the global economy. This scenario is not an attempt to spread fear but rather a plausible outcome. The instability of Kim Jong-un's regime could lead to either his assassination by a revolt triggered by economic hardship or a sudden military coup. In the event of the regime collapse, it would cause massive chaos.

To prevent North Korea from using its biological weapons, it is necessary to conduct rigorous inspections to verify their existence. The United Nations Security Council established the United Nations Special Commission (UNSCOM) in April 1991 to facilitate international cooperation in eliminating Iraq's weapons of mass destruction threats. Its initial focus was on identifying and overseeing the destruction of "prohibited items," including any means of developing or deploying chemical, biological, or nuclear weapons, as well as ballistic missiles with a range of over 150

km. The International Atomic Energy Agency (IAEA) was responsible for the nuclear arena, and the two organizations worked together closely. The second task was to establish a monitoring system to prevent Iraq from producing and obtaining prohibited items (Ekeus 2000).

In response to Iraq's refusal to allow UNSCOM's return, the UN Security Council deliberated the establishment of a new monitoring organization called UNMOVIC in December 1999. The proposal was first put forth by the UK and the Netherlands, but the US also participated in drafting the resolution. UNMOVIC was designed to have a robust monitoring regime, including inspections, and suspend sanctions if Iraq cooperated. The resolution established the structure of UNMOVIC, limiting its dependence and authorizing the Security Council to have a more significant role in its management. The emphasis was on supervising the executive chairman instead of controlling Iraq. UNSCOM had previously established a successful inspection and monitoring system, utilizing innovative techniques to uncover much of Iraq's prohibited weapons programs. UNMOVIC's success depended on the political climate in the Security Council being supportive (Ekeus 2000).

<Figure 3> 3 Track Approached to verify and destruct NK's Biological Weapon Program



Source: Authored/edited.

CONCLUSION

The pursuit of biological weapons by North Korea is a significant concern due to the highly contagious nature of some biological agents and the difficulty in containing their spread. While some experts dispute the existence of North Korea's bioweapons program, others assert that North Korea has the capability to produce and distribute dangerous biological agents. The potential use of these weapons against military and civilian targets is particularly worrying since a biological weapon would likely be dispersed as an aerosol that could easily spread.

The use of biological weapons can have significant impacts on both social and public health. From a social perspective, the use of these weapons can cause fear and panic in populations, leading to widespread disruption of social and economic activities. It can also create mistrust and suspicion among people, which can have long-lasting effects on the social fabric of a community or society. From a public health perspective, the use of biological weapons can have devastating consequences. Biological agents can cause a range of illnesses, including deadly diseases such as anthrax and smallpox. These illnesses can spread rapidly through a population, and it can be difficult to control the outbreak once it has started.

The use of biological weapons can also have secondary effects on public health, such as the loss of healthcare workers and resources, which can further exacerbate the situation. Additionally, the use of these weapons can lead to a loss of confidence in public health systems and authorities, which can lead to a breakdown in trust and cooperation between communities and governments.

In order to prevent the use of biological weapons, it is crucial for governments and international organizations to collaborate and develop effective strategies to reduce the impact of outbreaks caused by these weapons. To minimize the risk of biological warfare on the Korean peninsula, I proposed one approach involving three main efforts: verifying the North Korean biological threat; eliminating that threat; and strengthening South Korea's resilience in case deterrence fails against a potential biological attack from North Korea. These efforts could include intercepting the delivery of biological weapons, detecting their use, preventing exposure and infection, and managing the consequences of a biological weapon infection. The preparation for such a response could require substantial costs, and the level of preparedness may not be sufficient to adequately protect the entire population of South Korea. Nevertheless, the longer the delay in preparation, the more expenses South Korea will incur, and the resulting consequences will become irreversible.

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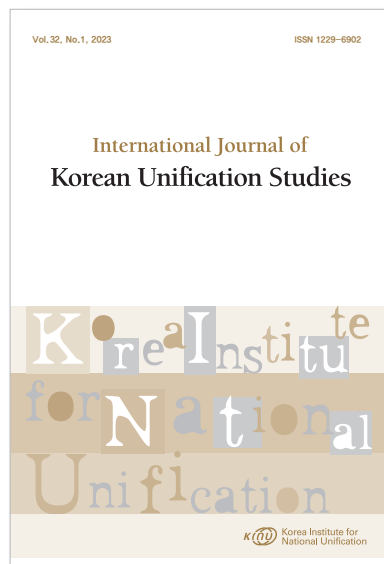
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