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New Perspectives on the ROK-U.S. Alliance : An Emerging Scholars Symposium

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The Research Institute for National Security Affairs (RINSA), South Korea's leading research institute at Korea National Defense University, dedicates itself to strengthening national security through a promotion of international collaboration and efficient defense practices. Every year RINSA presents International Joint Research Projects, focused on fostering a collaborative environment on the security issues surrounding Korea.

This year's RINSA Joint International Project presents two pieces of research: one focused on the Maritime MRO (Maintenance, Repair, and Overhaul) cooperation between ROK, US and Japan, and another aimed at bringing together early-career scholars from Korea and the US by hosting a joint workshop. The workshop covered various topics surrounding ROK-US alliance: wartime operational control transition, nuclear latency along with civil nuclear energy projects, space security, battery supply chains, industrial base policies including naval-industrial cooperation.

South Korea is one of the world's top shipbuilding nations, with the capacity to build a large fleet comprising of complex vessels on schedule. This capacity is essential for multinational maritime security project, especially for the allies like US which repeatedly faces constraints on timely deployment. Japan already serves as a maintenance hub for the US fleets deployed in the region. However, growing strategic rivalry between US and the People's Republic of China (PRC) is facilitating the need for faster readiness, and greater operational flexibility.

Recent developments in the ROK-US alliance centers on several issues including still-unresolved transfer of wartime operational control, nuclear latency in the face of threats from North Korea, as well as other emerging areas such as defense industrial cooperation. Across all issues, uncertainty in US domestic politics adds an underlying concern about the long-term stability and the direction of the alliance. Emerging areas of cyber, space, and advanced technologies are creating new opportunities as well as raising new questions.

PREFACE

In a world fraught with uncertainty, RINSA stands committed to promoting international cooperation and strengthening national defense capabilities. We believe our research serves not only South Korea, but also contributes to a more peaceful and prosperous future for Indo-Pacific region as a whole.

December 31, 2025

Director-General of Research Institute for National Security Affairs

Professor Park, Young June

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I. INTRODUCTION

Eunjung Lim
(Kongju National University)

This edited volume brings together nine papers presented at *the Emerging Scholars Workshop on the ROK-U.S. Alliance*, held at the Korea Economic Institute of America (KEI) in Washington, D.C., in late October 2025. The workshop was co-organized by Kongju National University and KEI and made possible through the support of the Korean National Defense University. The workshop was convened at a time of profound uncertainty in the international system, marked by intensifying great power competition, the erosion of long-standing norms, and expanding expectations placed upon U.S. alliances. Against this backdrop, the workshop sought to cultivate rigorous, policy-relevant scholarship by emerging researchers and to foster sustained dialogue on how the ROK-U.S. alliance can evolve in a manner that is both strategically credible and institutionally resilient. This volume reflects that ambition, offering a multifaceted examination of alliance transformation across security, technology, industrial cooperation, and the management of cross-border strategic challenges.

The ROK-U.S. alliance today faces a dual challenge. On the one hand, traditional deterrence concerns on the Korean Peninsula persist, as North Korea continues to advance its nuclear and missile capabilities while deepening cooperation with Russia and China. On the other hand, the alliance is increasingly expected to function as a broader strategic partnership—one that contributes to regional stability, technological leadership, supply-chain resilience, and the management of systemic risks in the international system. The chapters in this volume collectively address this expanded agenda, illustrating how alliance management now extends well beyond conventional military coordination.

The volume opens with Emily E. Kim's chapter on wartime operational control (OPCON) transition, a long-standing and politically sensitive issue within the ROK-U.S. alliance. Rather than treating OPCON as a binary question of transfer versus retention, Kim reframes the debate by examining how political and strategic arguments have been constructed and opposed over time. She argues that the

tendency to separate politics from strategy obscures the deeper significance of OPCON as an issue that embodies questions of sovereignty, command authority, and alliance trust. By holding political and strategic logics in productive tension, the chapter offers a more integrative framework for understanding how OPCON debates reflect the evolving nature of alliance governance itself.

Following the opening chapter on wartime operational control, the volume turns to the space domain as an emerging pillar of alliance adaptation. In Chapter 3, Seokjin Yun examines space security as an increasingly central component of deterrence and operational resilience in the ROK-U.S. alliance. As military operations grow ever more dependent on space-based assets for intelligence, surveillance, communications, and missile warning, Yun argues that space can no longer be treated as a peripheral or purely technical domain. The chapter traces South Korea's rapid shift toward military space capabilities in response to North Korea's missile advances and the growing contestation of space by China and Russia, while highlighting opportunities for deeper ROK-U.S. cooperation in joint development, data sharing, and institutional alignment.

Building on this expanded understanding of deterrence, Chapter 4 turns to the question of nuclear latency within the alliance. Jae Eun Han challenges the conventional assumption that latent nuclear capabilities necessarily undermine alliance cohesion or signal impending proliferation. Drawing on deterrence and hedging theory, she argues that nuclear latency—when embedded within strong institutional frameworks and clear political intent—can function as a stabilizing and adaptive feature of deterrence. Using South Korea as a case study, the chapter situates public opinion, nuclear energy infrastructure, and alliance mechanisms within a broader effort to manage uncertainty surrounding extended deterrence without crossing the nuclear threshold.

Chapter 5 then situates these deterrence debates within the broader framework of nuclear governance and alliance credibility. Kayla Orta examines the growing tension between South Korea's security concerns and its role as a leading exporter of civil nuclear technology. She argues that conflating deterrence-driven nuclear

debates with civil nuclear policy risks undermining both alliance cohesion and Seoul's international standing as a responsible nuclear supplier. Emphasizing the importance of nonproliferation commitments, IAEA safeguards, and close coordination with the United States, the chapter highlights how effective governance of civil nuclear cooperation is essential to sustaining trust, market competitiveness, and strategic alignment within the alliance.

The volume then broadens its focus beyond the bilateral alliance to examine how ROK-U.S. cooperation operates in third-country contexts. Shahad Turkistani's chapter analyzes Saudi Arabia's emerging nuclear energy program as a test case for allied coordination in an increasingly competitive and politicized global nuclear market. The chapter shows how export controls, intellectual property rights, nonproliferation standards, and commercial interests intersect in ways that require careful alignment between Washington and Seoul. By situating the Saudi case within recent developments in ROK-U.S. civil nuclear cooperation, Turkistani highlights both the risks of poorly coordinated export strategies and the potential for more partnership-based technological governance.

Alvin Camba's chapter situates the alliance within the broader political economy of U.S.-China rivalry, focusing on the battery economy and supply-chain bifurcation. He argues that middle powers such as South Korea play a critical but underappreciated role as system integrators, translating great power competition into functional economic arrangements that prevent systemic rupture. Through an analysis of Korean firms, industrial policy, and regulatory diplomacy, the chapter demonstrates how South Korea manages to sustain interdependence across competing blocs while aligning with U.S.-led frameworks. This contribution underscores the importance of industrial capacity and economic governance as central components of contemporary alliance strategy.

The final three chapters focus explicitly on defense industrial cooperation, an area that has moved to the forefront of alliance discussions in recent years. Fabian Villalobos and Bo Ram Kwon examine opportunities for strengthening ROK-U.S. cooperation on the defense industrial base and supply chains, drawing lessons from

recent conflicts and global disruptions. They argue that industrial capacity, logistics, and sustainment are now integral to deterrence, and that closer coordination can enhance both alliance readiness and resilience in prolonged contingencies. Their analysis highlights practical pathways for reducing barriers, pooling resources, and extending cooperation beyond the bilateral context.

Jaehyoung Ju's chapter builds on this theme by examining maritime-industrial cooperation, particularly shipbuilding, as a strategic asset for both countries. Situating shipbuilding within broader debates on national power, economic security, and technological innovation, Ju argues that ROK-U.S. cooperation in this sector is no longer merely beneficial but increasingly necessary. The chapter provides a conceptual framework for understanding shipbuilding as a form of defense innovation and illustrates how Korean industrial strengths can contribute to revitalizing U.S. maritime capacity.

Finally, NamTae (Joshua) Park offers a detailed analysis of the legal and regulatory barriers that constrain deeper shipbuilding cooperation between the United States and South Korea. Focusing on U.S. domestic laws and policy frameworks, the chapter identifies key political and institutional obstacles while reviewing recent legislative efforts to mitigate them. By proposing concrete remedies, Park's contribution highlights how legal reform can serve as an enabler of alliance cooperation rather than an impediment.

Taken together, the chapters in this volume illustrate the expanding scope and complexity of the ROK-U.S. alliance. They show that alliance management today encompasses not only deterrence and command structures, but also nuclear governance, space security, industrial capacity, supply chains, and global market competition. Just as importantly, this volume reflects a conscious investment in intellectual continuity. The workshop that produced these papers was designed not as a one-off event, but as part of a sustained effort to cultivate emerging scholars capable of engaging with the alliance's evolving demands.

As the international order undergoes profound transformation and the expectations placed upon alliances continue to grow, such efforts will remain indispensable. It

is our hope that this volume will contribute meaningfully to both scholarly debate and policy deliberation—and that it will encourage the continuation of similar initiatives aimed at strengthening the ROK-U.S. alliance through ideas, analysis, and dialogue.

II. Wartime Operational Control (OPCON) Transition and the US–ROK Alliance: Between Politics and Strategy

Emily E. Kim
(Atlantic Council)

1. Introduction

Following political transitions in both the United States and Republic of Korea (ROK), the pending transition of wartime operational control or “OPCON” has again risen to the fore of alliance discussions. OPCON has historically proved to be a thorny issue, at times both hotly contested and exceedingly oblique. A point of contention since the alliance’s conception, intersecting variables and shifting geopolitical paradigms have, over time, shaped the question of where and with whom operational control over the ROK’s armed forces should reside, particularly during “wartime.” OPCON has also frequently become a subject of public debate – despite an arguably low level of real popular comprehension – often making headlines at critical points in recent alliance history.

Operational control is technically defined as a subset of command authority, referring to the authority over units assigned to the Joint Command to conduct specific operations within a defined time and space.¹⁾ In common parlance, however, OPCON is often inflected with different meanings, depending on the regional, political, and strategic context in which it is discussed. Internationally, OPCON is often oversimplified as a question of whether the ROK is capable of commanding its own forces during a conflict.²⁾ This type of abstraction haunts debate within the Korean media, where OPCON often makes headlines portrayed as either a vital power that must be reclaimed to guarantee the ROK’s sovereignty, or a construct

1) Beomchul Shin, “Evaluation of the Transfer Process of Wartime Operational Control and Future Policy Directions,” Sejong Institute, June 27, 2025, <https://www.sejong.org/web/board/22/egorea.d.php?bd=24&itm=&txt=&pg=33&seq=12317>.

2) Julian Ryall, “Is South Korea ready to command its own troops at wartime,” Deutsche Welle, November 11, 2025, <https://www.dw.com/en/is-south-korea-ready-to-command-its-own-troops-at-wartime/a-74685586>.

that must be handled with caution to ensure the United States' continued commitment to the security situation on the Korean peninsula.

The US-ROK alliance has long dialogued over what it will take to transform and modernize the alliance - a quandary that has become increasingly complex and urgent as the world faces a new era of strategic competition shaped by the renewal of great power competition, a surging level of rearmament not seen since the Cold War, and a rapidly evolving regional and global security environment. Since taking office in June 2025, President Lee Jae Myung has confirmed that "regaining" wartime OPCON will be part of the agenda for his five-year term.³⁾ By all appearances, the US and ROK seem to be moving toward an accelerated transition, with both sides acknowledging that "meaningful" progress has been made and the ROK emphasizing its commitment to investing in the capabilities necessary for the transition to take place.⁴⁾ While the question of wartime OPCON transfer has reasserted itself in alliance discussions, however, the way forward is far from predetermined.

This paper aims to (re)situate the OPCON debate within the evolving political and strategic contexts that shape US-ROK alliance discussions. In what follows, I examine the historical development of the discourse surrounding OPCON to trace why it has become such an important touchstone within the US-ROK dynamic. Rather than putting forward an argument advocating for why or why not the transition should proceed, however, I focus on analyzing *how* this issue is argued in the public sphere. How is wartime OPCON imbued with various meanings and negotiated using different terms, and what does this tell us about the prevailing logics animating the alliance? I observe that commentary and analysis addressing OPCON transition are largely positioned as either political or strategic arguments - an oppositional

3) Min-ji Lee, "S. Korea Confirms Plan for OPCON Transfer Within Lee's 5-year Term," Yonhap News Agency, September 16, 2025, <https://en.yna.co.kr/view/AEN20250916010800315>.

4) "57th Security Consultative Meeting Joint Communiqué," US Department of War, November 14, 2025, <https://media.defense.gov/2025/Nov/14/2003820640/-1/-1/1/57-SECURITY-CONSULTATIVE-MEETING-JOINT-COMMUNIQUE.PDF>; and "Joint Fact Sheet on President Donald J. Trump's Meeting with President Lee Jae Myung," The White House, November 13, 2025, <https://www.whitehouse.gov/fact-sheets/2025/11/joint-fact-sheet-on-president-donald-j-trumps-meeting-with-president-lee-jae-myung/>.

distinction that is becoming increasingly fraught. OPCON transfer is a core alliance issue for the US and ROK, yet the extent to which the surrounding debate can be used to proximately ascertain the strength of the alliance merits critique. In close, I look toward the future of the US-ROK alliance, suggesting a more integrative framework that assesses how political power and command of force go hand in hand.

2. A History of OPCON Below the 38th Parallel

The history of OPCON encapsulates what some describe as the evolution of a “patron-client” relationship into today’s now over seventy-year-old “ironclad” or “titanium” alliance.⁵⁾ Nothing about this progression, however, was smooth or given. In the wake of Korea’s liberation from Japan at the close of World War II and the division of the peninsula agreed upon at Potsdam in 1945, the United States Military Government in Korea (USAMGIK) became the official authority south of the 38th parallel and assumed complete operational control over Korean security forces.⁶⁾ USAMGIK’s objective was to stabilize the transition of authority in the South and manage the increasingly volatile bouts of cross-border fighting to the North. After standing up the ROK Army and Navy, US occupation forces withdrew from the peninsula in June 1949, giving way to the first and only time to date that the ROK has maintained full OPCON of its armed forces.

When war broke out the following year, the United States redeployed to Korea, and Rhee Syng Man ultimately ceded operational control to the US-led United Nations Command (UNC). While the UNC served to organize a multinational, collective defense of the ROK, the US effectively exercised exclusive leadership over military

5) “The U.S.-South Korea Alliance,” Council on Foreign Relations, accessed October 20, 2025, <https://www.cfr.org/timeline/us-south-korea-alliance>; and Markus Garlauskas, “The ‘Ironclad’ US-South Korea Alliance is Outdated. A New Age Requires a ‘Titanium’ Alliance,” Atlantic Council, June 24, 2025, <https://www.atlanticcouncil.org/blogs/new-atlanticist/the-ironclad-us-south-korea-alliance-is-outdated-a-new-age-requires-a-titanium-alliance/>.

6) In-bum Chun, “US-Korea Military-to-Military Relations: Past, Present, and Future,” East-West Center, July 12, 2022, <https://www.eastwestcenter.org/publications/us-korea-military-military-relations-past-present-and-future>.

planning, arguing that it was providing the majority of weapons, equipment, and logistical support.⁷⁾ Following the armistice, the US-ROK alliance signed the Mutual Defense Treaty (MDT) in October 1953, with both agreeing that OPCON would remain with the US-led UNC.⁸⁾ On the United States' part, this decision advanced what some describe as a "control rod" logic, whereby the US sought to maintain "considerable influence over the security environment on the peninsula."⁹⁾ With an American commander in the lead, the United States could implement the planning and preparation necessary to deter North Korean aggression and mitigate crisis escalation – particularly by restraining the ROK's potential retaliation.

While to this day, the US maintains wartime OPCON over ROK forces placed under the joint command based on mutual coordination, the decades following the armistice show how the concept of OPCON should not be taken for granted as a fixed or uncontested construct. In 1961, Park Chung-hee came to power via a military coup, staged using Korean forces he had removed from under UNC OPCON without approval. Shifts in US policy toward its allies in the 1970s also influenced changes to OPCON's institutional structure. US officials wanted the ROK to take on a greater burden in its defense, though this desire warred with a preference to maintain leadership given the security environment and lingering biases regarding the ROK's ability to assume more responsibility. As the UNC grew unpopular among the UN General Assembly, however, and with the ROK's economy and military experience growing rapidly due to its involvement in the Vietnam War, the US supported measures to increase ROK participation in joint planning. Annual Security Consultative Meetings (SCM) and Military Committee Meetings (MCM) were established, in addition to the US-ROK Operational Planning Staff. In 1978, the Carter

7) Clint Work, "No More Delays: Why It's Time to Move Forward With Wartime OPCON Transition," Stimson Center, June 21, 2022, <https://www.stimson.org/2022/no-more-delays-why-its-time-to-move-forward-with-wartime-opcon-transition/>.

8) "Mutual Defense Treaty Between the United States and the Republic of Korea: October 1, 1953," (American Foreign Policy 1940-1955 Basic Documents Volumes I and II, Washington, DC, 1957), https://www.usfk.mil/portals/105/documents/sofa/h_mutual%20defense%20treaty_1953.pdf.

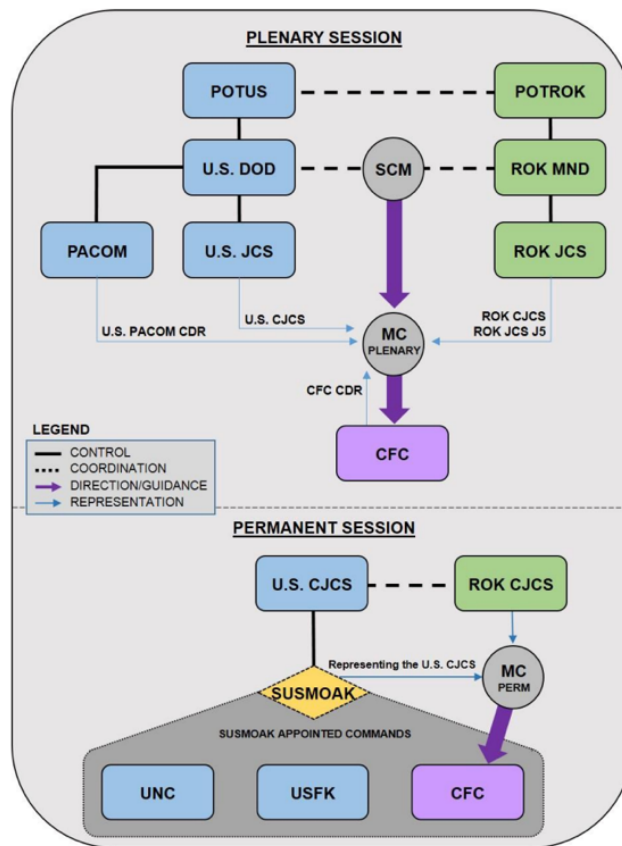
9) Clint Work, "The Variables of OPCON: The 'Control Rod' Logic in Today's ROK-US Alliance," *The Diplomat*, August 8, 2025, <https://thediplomat.com/2025/08/the-variables-of-opcon-the-control-rod-logic-in-todays-rok-us-alliance/>.

administration announced its intent to drawdown troops on the peninsula, and the Combined Forces Command (CFC) was created, transferring the defense of Korea from the multinational UNC (which would remain to administer the armistice) to the bilateral alliance.

Despite initial plans for the CFC to play only a transitional role in evolving the command architecture, increased deployments under the Reagan administration conversely led to the CFC's refinement and institutionalization. This would not be respected as the status quo for long, however, as Chun Doo Hwan removed ROK forces from CFC OPCON in 1980, cracking down on pro-democracy protestors in one of the most tragic incidents in modern Korean history. The Gwangju Uprising ignited the democratization or *minjung* movement in South Korea, carrying with it a rising tide of anti-American sentiment. The domestic public scrutinized the role of US forces on the peninsula, calling for their country to take back control of its own military and questioning the extent to which the US had knowledge of - or was complicit in - the deaths of hundreds of Korean citizens.¹⁰⁾

10) Peter Maas, "Anti-Americanism Grows in South Korea," The Washington Post, June 20, 1988, <https://www.washingtonpost.com/archive/politics/1988/06/21/anti-americanism-grows-in-south-korea/b6d6bc85-2f56-454e-b613-0d268b4729ac/>.

U.S. / ROK Alliance Military Committee



Source: Shawn Creamer, "Answering the Korea Question: U.S. Government Policy toward the Unified Command and the Korean Armistice Agreement." Defense Technical Information Center, January 3, 2017. <https://apps.dtic.mil/sti/citations/AD1078448>.

In 1990, US policy again shifted, with the Department of Defense's East Asian Strategic Initiative (EASI) calling for a three-phase force reduction across the Indo-Pacific and announcing the intention to shift from "a leading to supporting role" on the peninsula.¹¹⁾ The EASI further suggested that if the DPRK threat were to sufficiently diminish, the CFC could be dissolved as a final step towards the ROK

11) Heming Xu, "The Redefinition of the US-Japan Security Alliance and its Implications for China," in *Reflections on "Misunderstanding" China*, ed. Allen S. Whiting (Washington DC: Sigur Center for Asian Studies, 2001), 2.

taking the lead. The first phase of withdrawal from Korea was ultimately suspended due to the DPRK's suspected nuclear weapons program in 1992. Still, the US separated and transferred armistice or "peacetime" OPCON to the ROK in 1994 - a mostly symbolic measure conceived of to placate the ROK's mounting sovereignty-related concerns. While the ROK took on daily security management, however, the US retained control over crisis escalation and contingency planning through Combined Delegated Authority (CODA).

Tensions between the Korean people and US forces continued to rise, with flashpoints like the McFarland incident in 2000 and the Yangju highway incident in 2002 stoking domestic disapproval of the United States' influence over the ROK's affairs.¹²⁾ In 2003, Roh Moon-hyun entered office, pushing for full OPCON as necessary to the ROK's self-reliant defense and sovereignty. Then-Secretary of Defense Rumsfeld, who sought to increase the United States' strategic flexibility by making its force presence in Korea leaner, was receptive to Roh's initiative. Transfer of wartime OPCON was agreed upon in 2006 as outlined within a time-based plan - the Strategic Transition Plan (STP) - which held that the US and ROK would "expeditiously complete the transition of OPCON to the ROK after October 15, 2009, but not later than March 15, 2012."¹³⁾ The STP also described a parallel command structure that would displace the CFC, in which the ROK Joint Chiefs of Staff (JCS) would lead the joint defense with a US Korea Command (KORCOM) in support.

Power changed hands once more, however, as Lee Myung Bak' conservative administration assumed office and swiftly opposed the STP. Elsewhere, US and ROK officials criticized the STP and its suggested parallel structure for compromising unity of command threatening to weaken deterrence against North Korea.¹⁴⁾ Following

12) Hyeon-gyeong Kim, "U.S. man is found guilty of polluting Han River," JoongAng Ilbo, January 10, 2004, <https://koreajoongangdaily.joins.com/2004/01/10/socialAffairs/US-man-is-found-guilty-of-polluting-Han-River/2082386.html>; and Don Kirk, "Road Accident Galvanizes the Country: Deaths in Korea Ignite Anti-American Passion," The New York Times, July 31, 2002, <https://www.nytimes.com/2002/07/31/news/road-accident-galvanizes-the-country-deaths-in-korea-ignite.html>.

13) "The 38th Security Consultative Meeting Joint Communiqué," (Washington DC, 2006), <https://www.nukestrat.com/korea/JointCommunique2006.pdf>.

North Korea's second nuclear test in 2009, and the sinking of the *Cheonan* in 2010, Presidents Lee and Obama agreed to delay the transition of wartime OPCON to December 2015 under a new, Strategic Alliance 2015 (SA-2015) Plan.¹⁵⁾ Over the next few years, the alliance would discreetly drop the parallel command construct and drift away from a commitment to a predetermined timeline. By October 2014, the US and ROK agreed on a Conditions-based Operational Control Transition Plan (COTP), deferring OPCON transfer to some future point at which the ROK demonstrates it has the necessary military capabilities to lead its defense, and the regional security situation is perceived as conducive to a stable transition. The COTP set up a three-stage verification mechanism to periodically assess the ROK's progress, though this process has been subject to delays. While the Initial Operational Capability (IOC) assessment was successfully conducted in 2019, the second-stage Full Operational Capability (FOC) assessment was postponed during the COVID-19 pandemic and stalled indeterminately under President Yoon Suk Yeol.¹⁶⁾ Most recently, the US and ROK have exhibited a renewed commitment to charting a path toward expediting wartime OPCON transition and certifying FOC in 2026.¹⁷⁾

14) Work, 2022.

15) Tara O, "U.S.-ROK Strategic Alliance 2015," Council on Foreign Relations, September 1, 2010, <https://www.cfr.org/blog/us-rok-strategic-alliance-2015>.

16) Sarah Kim, "JCS Chiefs of Korea, U.S. Agree on Opcon Goals Over Phone," JoongAng Ilbo, February 2, 2021, <https://koreajoongangdaily.joins.com/2021/02/02/national/defense/Opcon-wartime-operational-control-Joint-Chiefs-of-Staff/20210202171000668.html>.

17) "57th Security Consultative Meeting Joint Communique."

3. The OPCON Debate

The various modulations of OPCON over time, both in terms of command architecture and political symbolism, have given way to competing narratives across the US and ROK regarding the transition process. The surrounding policy discourse, as articulated through the news media, in addition to commentary and analysis from several thinktanks and institutes, imbues OPCON with varying forms of significance. In the following section, I unpack some of these viewpoints, scoping out how this issue set is constructed by focusing on how the alliance and its respective domestic publics talk about OPCON. As a matter of public concern and debate, the concept of OPCON has exceeded its military utility and become mired with social, political, and cultural value.

US versus ROK Perspectives

As one might expect, perspectives on OPCON divide at the regional level. US voices on OPCON transfer emanate from various remarks made by defense officials, in addition to a relatively select pool of “Korea hands” across the policy and security studies communities. These individuals typically address OPCON in the context of US-ROK alliance modernization and the United States’ broader, regional strategic interests. “Modernization,” under the second Trump administration, essentially refers to a call for US allies to shoulder a greater burden in combined defense efforts, especially by making specific investments in capabilities the US feels are critical to respond to a rapidly evolving threat environment.¹⁸⁾ The US drive towards alliance modernization has also carried with it an emphasis on strategic flexibility. This is not a new concept; in the 2000s, the Bush administration’s involvement in the Middle East and subsequent changes to the United States’ global defense posture perpetuated the notion that USFK assets might be called on to operate across theaters. Strategic flexibility has taken on renewed meaning, however, as the US pivot to the Indo-Pacific and identification of the PRC as the primary pacing challenge for the

18) Andrew Yeo, “How Trump and Lee Can ‘Modernize’ the US-South Korean Alliance,” Brookings Institute, October 24, 2025, <https://www.brookings.edu/articles/how-trump-and-lee-can-modernize-the-us-south-korean-alliance/>.

DOD has more recently raised questions about the potential role of USFK in a Taiwan contingency.

In a scenario where the US might face simultaneous conflicts in East Asia, strategic flexibility also supports the argument for the ROK to shore up its own capabilities and leadership capacity, should US resources be spread beyond the peninsula. Conversely, the growing threat of a two-front war in East Asia has fostered views that now is not the time to push forward with OPCON transfer. Such a “symbolic handover” would introduce unpredictability, risking command friction that could domino into critical delays in allied coordination and battlefield setbacks.¹⁹⁾ Considerations of US extended deterrence further complicate the degree to which the logic of strategic flexibility supports OPCON transfer. Former USFK Commander General Bell, in his retirement, notably reversed his position from pro- to anti-transfer, citing the United States’ nuclear umbrella as a key factor. At the end of the day, he reasoned, American warheads were the ultimate factor in deterring and defeating the DPRK. Thus, the US would be best suited to “lead the charge.”²⁰⁾

In the aftermath of General Bell’s reversal of opinion, Sejong Institute Senior Research Fellow Kim Jung-sup published an op-ed arguing that the DPRK’s WMD capabilities pose a broader regional threat that must rather be “fundamentally...addressed through the alliance’s capabilities.”²¹⁾ Effectively deterring, and if necessary, defending against the DPRK nuclear threat would require a level of collaboration exceeding OPCON transfer, rather than comprising a variable or underlying condition in order for the transfer to take place. Kim further noted that General Bell’s change in perspective showed that not only the OPCON issue, but also the United States’ policy stance on USFK and the alliance writ large were “subject to change.” This observation betrays an anxiety that perhaps animates both progressive and conservative ROK views on

19) Ju Hyung Kim, “Not the Time to Transfer Wartime Control of Forces to South Korea,” Defense Opinion, August 7, 2025, <https://defenseopinion.com/not-the-time-to-transfer-wartime-control-of-forces-to-south-korea/980/>.

20) Si-young Choi, “US Generals Warn Against Rush for OPCON Transfer,” The Korea Herald, February 21, 2021, <https://www.koreaherald.com/article/2562310>.

21) Jung-sup Kim, “Why OPCON Transfer Conditions are Subject to Change,” Hankyoreh, February 25, 2021, https://english.hani.co.kr/arti/english_edition/english_editorials/984530.html.

OPCON transition. Some in the ROK have long feared that completing OPCON transition could enable the US to moderate or even abandon its role in a crisis escalation or future war on the peninsula. Many conservatives in the ROK thus maintain that the transfer must be handled with caution, as OPCON largely represents the institutionalization of US security guarantees and commitment to the joint defense.²²⁾ This camp is also wary of accelerating the transition as it might affect deterrence, worrying that a shift in command authority could alter DPRK perceptions of US-ROK military readiness and lead to a miscalculation.

On the other hand, progressives in the ROK tend to advocate for pressing forward with OPCON transition, emphasizing the nation's full command of its own military as a vital component of sovereignty. This viewpoint, to a certain extent, builds upon the various threads of discontent that emerged from the ROK's democratization movement over the level of US influence in ROK affairs. *Returning* OPCON to the ROK would thus be seen as a corrective to a historically hierarchical relationship. As Colonel (US Army, Ret.) Shawn Creamer previously wrote, OPCON transition has in some ways become “an expression used to convey the ROK's aspiration to assume and exercise unilateral control over its armed forces in wartime.” Still, the ROK stepping up its role in the joint defense would complement the US desire for strategic flexibility, while also assuaging concerns that the ROK could become unwillingly entangled in shifting US regional priorities.

Between Politics and Strategy

While various schools of thought on OPCON divide along regional lines, cross-cutting characterizations also exist, spanning a spectrum of political and strategic thought. Across the Pacific, the language used to articulate the OPCON issue frequently labels arguments as strategic or political in nature, framing each category as necessarily in opposition to the other. Arguments that confront the “military realities” of OPCON

22) In-bum Chun, “Wartime OPCON: Balancing Sovereignty and Security,” *The Korea Times*, October 3, 2025. <https://www.koreatimes.co.kr/opinion/20251003/wartime-opcon-balancing-sovereignty-and-security>.

are deemed “strategic” and “pragmatic.” This characterization portrays wartime OPCON transition as an issue that will ultimately be adjudicated according to its ostensibly objective qualities, ultimately superseding legal or political considerations. With this comes a view critical of opinions that “politicize” OPCON. In practice, the politicization of OPCON has become an umbrella term for mentions of ROK sovereignty and the way in which ROK attitudes regarding the transition tend to oscillate across conservative and progressive administrations. Effectively, this often paints sovereignty advocates as dominated by historical and psychological factors related to residual grievances over the US role in Korean affairs. The positioning of “strategic” arguments as opposite the “political” further maps onto a set of associative traits: security pragmatists are objective, rational, and realistic, while those seeking political expediency are subjective, emotional, and idealistic.

Whether intentional or not, the bifurcation of strategy and politics as competing narratives – and the resulting implication that the former necessarily offers a more practical approach than the latter – becomes problematic when confronting the current state of US-ROK affairs. As Trump has settled into his second term, appeals to “common sense” have become a frequent feature of his administration’s rhetoric. While “common sense” resonates conceptually with the strategic thinker who seeks to parse security issues through a lens of rationality, in the domestic context of the United States, “common sense” carries with it a highly political connotation as it has been used to justify a slew of unprecedented actions undertaken by the current government.²³⁾ Lee, somewhat in parallel, has advanced a foreign policy principle of “pragmatism” meant to guide Lee’s administration down whatever path is best for the ROK. Arguably, however, this allows Lee a degree of strategic ambiguity when it comes to security issues the US has long sought the ROK to commit itself to, such as the rising threat of the PRC or the provision of military support during a quarantine or blockade of Taiwan.

Overall, OPCON has in many ways become a buzz word used to denote a range

23) Danielle Kurtzleben, “Trump Uses ‘Common Sense’ to Make a Political Point. It Has Populist Appeal,” NPR, October 22, 2025, <https://www.npr.org/2025/10/22/nx-s1-5581554/trump-common-sense>.

of concerns related to the future of the US-ROK alliance. It is worth noting, as several have before, that the sort of change implied by the word “transfer” or “transition” may be misleading. The COTP does not call for a drastic reconfiguration of USFK, and the CFC system would not be dissolved or heavily distorted. Most visibly, the commander and deputy commander’s nationalities would swap. Still, there is understandably a deep resistance on both sides to seeing their troops under another nation’s command. The tension between the technical parameters of OPCON transfer and its psychological and political realities should instead point us towards an understanding of security and politics as co-constitutive. Conflicting US and ROK conceptions of rationality destabilize the strategist’s reliance on an objective world of analysis, as debates over OPCON have bled into a sphere of discourse infused with various political contingencies. OPCON transfer lies at the crux of this problem, as the rational control of force is a central source of legitimacy for modern states. Calling into question the definition of what is rational consequently challenges the foundation of political power – the command of force.

4. Policy Implications

A Test of Political Will

If and when wartime OPCON transition moves forward, it will carry with it real changes in sub-command authority that will alter operational realities and military-to-military relations. The proliferation of the term “OPCON transfer” in popular discourse, however, has also exceeded the scope of its technical definition. Public mentions of OPCON have come to denote a penumbra of concerns implicitly – and sometimes inaccurately – assumed to indicate the strength and future of the US-ROK alliance. Policymakers and analysts alike must understand that while the strategic dimensions of OPCON transition cannot be ignored, this is also an issue whose negotiation will come down to a test of political will. The political symbolism and cultural significance of wartime OPCON should not be easily disregarded; indeed, the dignity and national pride ascribed to “regaining” OPCON is an important objective for the ROK. Nonetheless, OPCON transition will continue to prove a test

case for the alliance's institutional limits - a vulnerability that adversaries can exploit. Gray-zone provocations by the DPRK, for example, could escalate tensions on the peninsula, toeing the threshold of war and complicating the armistice/wartime distinction ostensibly dictating where OPCON resides.²⁴⁾ As the transition is adjudicated, the US and ROK should not let political exigencies distract from the imperative to ensure the alliance can also respond effectively under the current command structure.

Transactionalism is No Replacement for Trust

Administration changes in both countries have wrought a series of unexpected challenges for the alliance across the political, economic, and security realms. The alliance faces a precarious moment, as the dynamic seems to be dominated by a calculus of give and take rather than mutual support. By all appearances, the US-ROK relationship is suffering for this, uneasily stabilizing after a period of tariff negotiations that at one point demanded the ROK provide \$350 billion upfront in cash. Some might argue that the term “transactional” is perhaps being overused in describing the Trump administration's demands and attitude toward its allies. Transactions may occur on a cost-benefit basis, but they can still align with larger strategic and operational objectives. Still, transactionalism is no replacement for trust. For likeminded allies and partners, it remains critical that transactions are issued from shared strategy and value sets. As the OPCON debate shows, even the language of transactionalism and its supposed “rationality” can be tailored toward political ends. Appeals to pragmatism have, more than anything, amounted to political posturing.

Strengthen Accountability and Work to Close Gaps in Understanding

While mastering the game of transactions will not solve long-term issues of alliance

24) Sang-ho Song, “Expert calls for greater efforts to better deter N. Korea in ‘gray zone’ shy of full-scale war,” Yonhap News, October 10, 2025, <https://en.yna.co.kr/view/AEN20251010000200315>.

cohesion, neither will trust alone. Beyond strategic and values-based symmetries, the US and ROK must also agree upon concrete terms advancing their goals and common interests. Transparency and clear communication through core alliance institutions like the annual SCM and MCM are key. Publicly recommitting to a time horizon for moving wartime OPCON transition forward, as the US and ROK did at the 57th SCM, is a meaningful step towards bringing both parties to the table to more productively coordinate on the way ahead. Future discussions should continue to work to limit uncertainty and potential miscommunication when it comes to the third condition of the COTP: the conduciveness of the regional security environment toward the transition taking place. In this regard, it is critical for the US and ROK to work to close gaps in understanding – particularly regarding peninsular and regional threat perceptions – across governments, the various levels of command, non-government organizations, and the private sector. While we must accept that it is rarely possible to reach a perfect consensus, the value of fostering people-to-people ties as a foundation for mutual awareness and comprehension cannot be understated.

5. Conclusion

The long and contested history of OPCON transition reflects how debates over command authority are not merely technical, but rather reflect deeper political, strategic, and symbolic forces shaping the US-ROK alliance. As both countries navigate a period of heightened geopolitical uncertainty and domestic political flux, the meanings ascribed to OPCON continue to straddle tensions that animate the two countries' longstanding partnership. The increasingly blurred line between “political” and “strategic” arguments underscores how questions of sovereignty, rationality, and legitimacy are co-constitutive rather than oppositional dimensions of alliance management. Understanding OPCON transition requires an integrative framework that recognizes how operational realities, political will, and public discourse interact to shape the future of the joint defense. The trajectory of OPCON will ultimately serve not only to test alliance cohesion, but also to gauge how the United States and Republic of Korea conceive of shared power, trust, and regional responsibilities in the decades ahead.

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III. ROK-U.S. Alliance for Space Security: Propelling Defense Cooperation in the Final Frontier

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1. Introduction

South Korea (formally the Republic of Korea; ROK) is rapidly positioning itself as a formidable player in defense space, with the ROK-U.S. alliance emerging as the critical enabler of its ambitions. The space domain has become central to deterrence and alliance resilience against escalating security threats from regional adversaries, and both Seoul and Washington increasingly recognize that they cannot confront these challenges alone.

Although historically focused on civil space development, South Korea's strategic priorities have shifted rapidly toward military space capabilities. The accelerating North Korean missile and nuclear challenge, the growing complexity and contestation of space, and the broader geopolitical reverberations of Russia's war in Ukraine are reshaping both Seoul's security calculus and expectations for a greater regional role. A surge in defense space asset development, the rise of emerging domestic defense space players, and South Korea's broader success in defense exports have catalyzed this transformation.

South Korea now plans to field a full suite of sovereign capabilities by the 2030s, including indigenous military rockets, intelligence, surveillance, and reconnaissance (ISR) satellites, secure satellite communications (SATCOM), and positioning, navigation, and timing (PNT) systems. While the United States remains the global leader in military space technology, it has acknowledged the limitations of pursuing these efforts alone—facing high costs, growing operational demands in the Indo-Pacific, and the strategic importance of resilience through allied contributions. The U.S. Space Force's *International Partnership Strategy* (July 2025) codifies this recognition by treating allies as collaborative developers rather than mere customers.¹⁾ For these initiatives to materialize, Seoul and Washington must outline

a bolder, longer-term roadmap for cooperative military space efforts.

Although Washington has expressed concerns over Seoul's ambitious pursuit of sovereign military space capabilities, South Korea's independent development aligns with a broader trend among U.S. allies seeking greater autonomy and resilience. For instance, France maintains advanced space launch capabilities and a robust defense space industry critical to sustaining its nuclear deterrent.²⁾ Recognizing similar ambitions for autonomy, Washington needs to work constructively within these constraints to align efforts toward shared strategic objectives.

2. Space as a Strategic Domain in the ROK-U.S. Alliance

Space is critical to the strength of the ROK-U.S. alliance. Modern warfare's growing reliance on space-based capabilities—ISR for precision targeting, SATCOM for secure command links, and PNT for munitions accuracy—is particularly critical for South Korea. The Ukraine conflict demonstrated the necessity of resilient satellite networks, underscoring the need for robust and diversified space architectures. Space technology enables South Korea to contribute to regional security missions across the Indo-Pacific, including maritime domain awareness and coordination with regional partners on maritime safety and environmental monitoring.³⁾

A concrete example illustrating both allied dependence and the drive for sovereign capability is Operation Dawn of the Gulf of Aden, conducted in January 2011. The ROK Navy executed a naval operation to rescue a South Korean chemical tanker from Somali pirates in the Arabian Sea. The operation's success was supported

1) U.S. Space Force, *U.S. Space Force International Partnership Strategy* (Arlington: U.S. Space Force, 2025), https://www.spaceforce.mil/Portals/2/Documents/SAF_2025/USSF%20International%20Partnership%20Strategy.pdf.

2) Bruce McClintock et al., *Allied by Design: Defining a Path to Thoughtful Allied Space Power* (Santa Monica: RAND Corporation, 2024), 57-59, https://www.rand.org/pubs/research_reports/RR1739-1.html.

3) "Policy Recommendations for Maritime Domain Awareness and Space Technology," The Maureen and Mike Mansfield Foundation, October 25, 2023, 10-15, <https://mansfieldfdn.org/wp-content/uploads/Maritime-Domain-Awareness-2023.pdf>.

critically by U.S. military satellite communications providing situational awareness and command links.⁴⁾ However, the limited availability of domestic satellite imagery during the event revealed critical capability gaps, sparking South Korean leaders' interest in developing independent military reconnaissance satellites to ensure greater strategic autonomy in future contingencies.⁵⁾

In the aerial domain, space-based assets are indispensable for early warning and missile defense, particularly given the need for enhanced ROK-U.S. cooperation amidst Asia's increasingly complex missile threat environment.⁶⁾ While South Korea possesses early warning radar systems, space-based detection systems provide a critical complement by overcoming the line-of-sight limitations caused by the Earth's curvature. This extended field of vision significantly enhances tracking of low-altitude and maneuverable missile threats, while also enabling detection of missile trajectories that pass through the upper atmosphere or briefly enter space, making space systems an effective pillar of regional deterrence.

Moreover, space access is fundamental to a broad notion of national security that integrates vital socioeconomic and technological facets crucial to the alliance's economic health. Remote sensing satellite capabilities used in ISR also serve important roles in providing geospatial data for timely infrastructure, agricultural, and environmental monitoring. Telecommunications networks increasingly rely on space-based infrastructure to maintain seamless global connectivity, while precision PNT services such as the U.S. Global Positioning System (GPS) satellites underpin secure financial transactions, essential logistics, and resilient digital systems. Looking ahead, the growing reliance on unmanned aerial systems and Internet of Things

4) In Kyo-jhin, “中 언론 韓 해적급습작전, 주도면밀했다” [Chinese media: S. Korea's pirate raid operation was thorough], *Yonhap News Agency*, January 24, 2011, <https://www.yna.co.kr/view/AKR20110124085500083>.

5) Interview with Korean space policy experts, interview by author, Republic of Korea, September 2025.

6) Ankit Panda, *Indo-Pacific Missile Arsenals: Avoiding Spirals and Mitigating Escalation Risks* (Washington D.C.: Carnegie Endowment for International Peace, 2023), 20-22, <https://carnegieendowment.org/research/2023/10/indo-pacific-missile-arsenals-avoiding-spirals-and-mitigating-escalation-risks?lang=en>.

devices demands centimeter-level positional accuracy and connectivity, capabilities uniquely enabled by satellite technologies.

On a larger scale, outer space is a rapidly contested domain imperative not only for military security but for scientific innovation, technological progress, and commercial growth. Many of the associated technologies also have valuable dual-use applications. Leveraging its strengths in manufacturing, ICT, telecommunications, and semiconductors, South Korea is well-positioned as a key industrial partner to the United States in the emerging space economy. South Korea also aims to harness emerging technologies such as artificial intelligence (AI), 6G satellite communications, AI-driven space data analytics, production of space-grade semiconductors, satellite manufacturing, and robotics.

3. The Evolving Space Security Threat Landscape

South Korea's historic defense focus has been predominantly army-centric, with a security posture narrowly geared toward countering North Korea's conventional military threats. As a result, space capabilities were not initially prioritized as an independent security domain, partly due to North Korea's previously limited space and counterspace presence. Early South Korean assessments of space-related risks framed them largely in terms of accidental collisions and space debris, rather than deliberate hostile actions.⁷⁾ However, this perspective is shifting rapidly in response to a deteriorating strategic environment characterized by three converging challenges: North Korea's advancing missile and nuclear programs; escalating counterspace threats from China and Russia; and the emerging strategic alignment among these powers.

North Korea remains the most immediate and persistent security concern for Seoul. Pyongyang's advancing ballistic missile and nuclear capabilities continue to raise

7) Lee Su-Mi and Jeong Hanbeom, "The Dynamics of South Korea's Space Trajectories," in *The Oxford Handbook of Space Security*, ed. Saadia M. Pekkanen and P. J. Blount (Oxford: Oxford University Press, 2023), 520-21, <https://doi.org/10.1093/oxfordhb/9780197582671.013.29>.

the strategic stakes for South Korea's space and missile defense posture. Its expanding arsenal of solid-fuel missiles, submarine-launched ballistic missiles, and emerging hypersonic systems has significantly increased the complexity of detection, tracking, and interception. In response, South Korea has accelerated the development of an integrated missile defense architecture that fuses space-based reconnaissance, early warning satellites, and ground-based interceptors to ensure real-time detection and enable preemptive or rapid-response options against increasingly sophisticated North Korean launches.⁸⁾

Effective and persistent surveillance over North Korean territory remains a critical yet vulnerable element within Seoul's "Three-Axis" defense framework, which comprises the Kill Chain, the Korea Air and Missile Defense (KAMD) system, and the Korea Massive Punishment and Retaliation (KMPPR) plan.⁹⁾ Among these, the Kill Chain concept hinges on continuous and precise data from reconnaissance and early warning satellites to detect, identify, and neutralize missile threats before launch or during their flight trajectory. However, Pyongyang's expanding use of solid-fuel and mobile launch systems has substantially eroded Seoul's decision window, requiring a larger need for better coverage.¹⁰⁾ While manned and unmanned airborne platforms contribute to this surveillance effort, their ability to monitor activity near the border is limited, driving South Korea's push to develop advanced satellite imagery capabilities with higher revisit rates to supplement coverage by U.S. spy satellites.

Concurrently, South Korea confronts persistent and escalating threats from North Korean operations in the electromagnetic and cyber domains targeting both military and civilian systems. Since 2024, GPS jamming incidents have escalated sharply, disrupting critical navigation for aircraft and maritime vessels along the western

8) Clint Work, "Navigating South Korea's Plan for Preemption," War on the Rocks, June 9, 2023, <https://warontherocks.com/2023/06/south-koreas-plan-for-preemption/>.

9) Jung Doyeong, "South Korea's Revitalized Three Axis System," Council on Foreign Relations, January 4, 2023, <https://www.cfr.org/blog/south-koreas-revitalized-three-axis-system>.

10) Joseph Dempsey, "North Korea: towards a solid-fuel ICBM?," International Institute for Strategic Studies, February 14, 2023, <https://www.iiss.org/online-analysis/online-analysis//2023/02/north-korea-towards-a-solidfuel-icbm>.

maritime border.¹¹⁾ Cyber intrusions present equally serious risks, with North Korean-linked hackers attempting to access classified space technologies and sensitive satellite data.¹²⁾ Although the National Intelligence Service established a consultative body on satellite cybersecurity in June 2024 to coordinate defensive measures, satellites still remain especially vulnerable due to limited onboard processing capabilities and the complex, multi-segment architecture that broadens their attack surfaces.¹³⁾

Beyond the immediate North Korean threat, South Korea's space assets face escalating risks from counterspace operations by **China and Russia**, which intelligence indicates now include both reversible non-kinetic measures and destructive kinetic options such as direct-ascent anti-satellite (ASAT) tests, electronic jamming, and sophisticated cyber intrusions.¹⁴⁾ Both countries are also advancing on-orbit maneuvering capabilities, as seen with Russia's Cosmos 2588 satellite and China's SJ-21 and SJ-25, whose proximity and repositioning operations demonstrate growing potential for co-orbital ASAT threats.¹⁵⁾

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- 11) Yang Ji-ho and Park Su-hyeon, "Exclusive: North Korea jammed South's GPS for 329 straight days," *Chosun Ilbo*, September 1, 2025, <https://www.chosun.com/english/north-korea-en/2025/09/01/WDLXCEVEA5EOTFVE5YVHZJPOMA/>; see also Yi Wonju, "N. Korea's GPS jamming expands to wider regions," *Yonhap News Agency*, November 16, 2024, <https://en.yna.co.kr/view/AEN20241116002700315>.
 - 12) Park Si-soo, "North Korea-Linked Hackers Accessed South's Rocket Developer: Spy Agency," *SpaceNews*, July 9, 2021, <https://spacenews.com/north-korea-linked-hackers-accessed-south-s-rocket-developer-spy-agency/>; Song Bok-gyu, "[단독] 한국 위성 운영의 심장 해킹에 뚫렸다...우주 청 설립 앞두고 보안 '구멍' [[Exclusive] Heart of South Korean Satellite Operations Hacked... Security 'Hole' Exposed Ahead of Space Agency Launch]", *Chosun Biz*, March 25, 2024, <https://biz.chosun.com/science-chosun/science/2024/03/26/QH6X2YD5A5FLDJDYJXJPMJA5M/>.
 - 13) Kim Arin, "South Korea forms satellite cyber security body," *The Korean Herald*, June 4, 2024, <https://www.koreaherald.com/article/3408136>.
 - 14) "Space Threat Fact Sheet," U.S. Space Force, accessed October 13, 2025, <https://www.spaceforce.mil/About-Us/Fact-Sheets/Fact-Sheet-Display/Article/4297159/space-threat-fact-sheet/>.
 - 15) Theresa Hitchens, "Russia's new Cosmos satellite orbiting near US sat, piques ASAT fears," *Breaking Defense*, May 30, 2025, <https://breakingdefense.com/2025/05/russias-new-cosmos-satellite-orbiting-near-us-sat-piques-asat-fears/>; Theresa Hitchens, "Chinese sats appear to be attempting first-ever on-orbit refueling, sat tracking firms say," *Breaking Defense*, June 19, 2025, <https://breakingdefense.com/2025/06/chinese-sats-appear-to-be-attempting-first-ever-on-orbit-refueling-sat-tracking-firms-say/>.

Russia's conduct in the Ukraine conflict offers concrete examples of these threats in practice. In the hours before the February 2022 invasion, Russian hackers launched a cyberattack that targeted SATCOM terminals connected to Viasat's KA-SAT network, a commercial satellite provider heavily relied upon by Ukrainian military and civilian users.¹⁶⁾ Throughout the war, Russian forces have also used Tobol electronic-warfare systems to disrupt Starlink uplinks and jam GPS signals that support precision munitions, reducing their effectiveness on the battlefield.¹⁷⁾ In addition to these non-kinetic actions, reporting in early 2024 raised concerns that Russia is pursuing space-based nuclear capabilities that could be used to target U.S. satellite networks, which could also indiscriminately disrupt or degrade South Korean satellites operating nearby.¹⁸⁾

More concerning are indications of a deepening trilateral partnership among China, Russia, and North Korea in the space domain, which poses a complex and evolving challenge to regional security. This development has sparked a maturing shift in Pyongyang's space strategy, evolving from using satellite launches primarily to mask ballistic missile development toward pursuing an independent national space program comprising imagery and communications satellites. The strongest and most visible link is between North Korea and Russia, whose ties have strengthened markedly since the outbreak of the Russo-Ukrainian war, with North Korea supplying munitions in exchange for advanced military technology. Notably, the September 2023 summit between Putin and Kim Jong-un took place at Russia's Vostochny Cosmodrome, where Putin explicitly promised Russian assistance to North Korea

16) David E. Sanger and Kate Conger, "Russia Was Behind Cyberattack in Run-Up to Ukraine War, Investigation Finds," *The New York Times*, May 10, 2022, <https://www.nytimes.com/2022/05/10/us/politics/russia-cyberattack-ukraine-war.html>.

17) Alex Horton, "Russia Tests Secretive Weapon to Target SpaceX's Starlink in Ukraine," *The Washington Post*, April 19, 2023, <https://www.washingtonpost.com/national-security/2023/04/18/discord-leaks-starlink-ukraine/>; Sam Skove, "Russia Is Jamming US Precision Weapons in Ukraine, US General Says," *Defense One*, December 12, 2023, <https://www.defenseone.com/defense-systems/2023/12/russia-jamming-us-precision-weapons-ukraine-us-general-says/392707/>.

18) Julian E. Barnes et al., "Russia's Advances on Space-Based Nuclear Weapon Draw U.S. Concerns," February 14, 2024, *The New York Times*, <https://www.nytimes.com/2024/02/14/us/politics/intelligence-russia-nuclear.html>.

for building satellites.¹⁹⁾

Following this summit, North Korea's government space agency, the National Aerospace Technology Administration (NATA), made substantial improvements in its satellite launch capabilities, successfully deploying the Malligyong-1 spy satellite in November 2023 after two earlier failed attempts, likely made possible through Russian technological support.²⁰⁾ Furthermore, the June 2024 signing of the North Korean-Russian Treaty on Comprehensive Strategic Partnership laid the foundation for long-term military and technological cooperation.²¹⁾

Should this cooperation expand, it may enable North Korea to deploy offensive space or counterspace tools to threaten allied assets and complicate missile defenses. The likelihood of North Korea targeting allied space assets in crises, including the potential use of nuclear capabilities similar to current Russian plans, is increasing as North Korea matures its nuclear and space capabilities. With its growing space ambitions, North Korea is also expected to develop its own ISR capabilities over time, and can receive indirect space-based support from Russia or China—such as the provision of ISR, PNT, or SATCOM services—similar to allied assistance to Ukraine. This could play a significant role in a potential Korean contingency, or in a complex dual contingency involving both the Taiwan Strait and the Korean Peninsula, where Russia or China could support North Korea to distract coordinated allied efforts.²²⁾ Furthermore, conflict in one theater could degrade allied space capabilities, thereby risking deterrence failures in another.

19) Kim Tong-hyung and Dasha Litvinova, "North Korea's Kim arrives in eastern Russian city for expected visit to fighter jet plant," *Associated Press*, September 14, 2023, <https://apnews.com/article/north-korea-russia-kim-putin-missile-0d70f5190df1088ebe53e8ca19f8e9c9>.

20) Hyung-Jin Kim, "South Korea Says Russian Support Likely Enabled North Korea to Successfully Launch a Spy Satellite," *Associated Press*, November 23, 2023, <https://apnews.com/article/north-korea-spy-satellite-russia-assistance-6461d7216fa5bd3fa0945efeb06530c6>.

21) Jenny Town et al., "Takeaways from the Putin-Kim Summit," Stimson Center, June 21, 2024, <https://www.stimson.org/2024/takeaways-from-the-putin-kim-summit/>.

22) Andrew Yeo and Hanna Foreman, "Is South Korea ready to define its role in a Taiwan Strait contingency?," Brookings Institution, March 28, 2025, <https://www.brookings.edu/articles/is-south-korea-ready-to-define-its-role-in-a-taiwan-strait-contingency/>.

Managing this contested space domain through space situational awareness (SSA) and space domain awareness (SDA) is critical. SSA focuses on detecting, tracking, and predicting the location and behavior of space objects by integrating data from ground-based sensors such as radar and electro-optical systems, as well as space-based sensors. SDA builds on SSA by incorporating intelligence, environmental context, and intent analysis, offering a comprehensive, actionable understanding of the space environment and its operational dynamics in a military context.²³⁾ In an increasingly congested space domain facing intersecting threats from growing debris and proliferating satellites, allied efforts to improve SDA are central to preventing miscalculations, enabling early warning, and sustaining deterrence against adversaries seeking military advantage in space.²⁴⁾

Another line of effort for the ROK-U.S. alliance is to expand strategic thinking against emerging space threats toward securing reversible yet offensive capabilities to deny adversary use through means such as reversible electronic warfare jamming, cyberattacks, and temporary satellite disruption. The U.S. Space Force has moved away from reserved attitudes, now actively promoting the strategic view of space as a warfighting domain and the imperative of maintaining space superiority.²⁵⁾ Commensurately, ROK strategic thinking and capabilities also need to be developed for the proactive defense of national interests in space.

23) Sandra Erwin, "Air Force: SSA is no more: it's 'Space Domain Awareness'", *SpaceNews*, November 14, 2019, <https://spacenews.com/air-force-ssa-is-no-more-its-space-domain-awareness/>.

24) Ankit Panda, "U.S.-ROK Alliance Cooperation in the Space Domain: Charting a New Agenda," in *The Next 70 Years: Future Paths for the ROK-U.S. Alliance and Defense Cooperation*, ed. Bo Ram Kwon (Seoul: Korea Institute for Defense Analysis, 2023), 235-36.

25) U.S. Space Force, *Space Warfighting - A Framework for Planners* (Arlington: U.S. Space Force, 2025), 4-12, [https://www.spaceforce.mil/Portals/2/Documents/SAF_2025/Space_Warfighting_-_A_Framework_for_Planners_BLK2_\(final_20250410\).pdf](https://www.spaceforce.mil/Portals/2/Documents/SAF_2025/Space_Warfighting_-_A_Framework_for_Planners_BLK2_(final_20250410).pdf).

4. Progress in the ROK-U.S. Space Security Partnership

South Korea's Emerging Space Security Capabilities

Despite these escalating threats, recent institutional reforms and cooperative initiatives have begun positioning the alliance to address these challenges. South Korea is swiftly transforming itself into a formidable space security actor. By the close of 2025, South Korea will have achieved a substantial portfolio of military space assets, supported by the Korean Ministry of National Defense (MND) placing strategic emphasis on space capabilities in recent years. (See Appendix 1 for details).

The Korean defense industry likewise aspires to play a greater role, recognizing the growing importance of space-enabled defense integration. Efforts are underway to combine combining capabilities such as 6G-enabled SATCOM constellations and high-resolution satellite imagery with AI-powered analytics and command-and-control solutions. Although still in early stages and constrained by a limited domestic market for defense space, these ambitions hold significant promise for partnerships and technology sharing with U.S. firms, including co-production opportunities.

This emphasis is also supported by strong executive backing, with the *2023 National Security Strategy* under President Yoon Suk Yeol highlighting space as one of ten priorities for strategic defense technologies, and notes that the country should “secure a range of space capabilities” such as ISR, SATCOM, SDA, and space launch vehicles.²⁶⁾ In May 2024, KASA was established under the Ministry of Science and ICT (MSIT) to consolidate and coordinate fragmented Korean space agencies and oversee the development of major national projects like the next-generation reusable rocket, KSLV-III.²⁷⁾

President Lee Jae Myung is no exception to South Korea's longstanding desire to

26) Republic of Korea Office of National Security, *National Security Strategy* (Seoul: Office of National Security, 2023), 80-81.

27) Jacob Bradley, “Why Did South Korea Create a New Space Agency?,” Center for Strategic and International Studies, November 8, 2024, 3, https://aerospace.csis.org/wp-content/uploads/2024/11/Bradley_KASA_Final.pdf.

secure independent space and defense capabilities. Though the Lee administration's National Defense Strategy had not yet been released as of October 2025, space and defense development goals were prominently included in the government's *123 National Policy Tasks* released in September 2025.²⁸⁾ The administration emphasizes cultivating competitive domestic space companies under the "K-Space" vision, expanding aerospace defense exports, and enhancing military space capabilities and strategic thinking, including the phased establishment of a dedicated Space Strategy Command within the military.

Expanding the ROK-U.S. Alliance into Space

Over the past decade, the ROK-U.S. alliance has elevated space as a critical domain of cooperation. Two landmark developments have anchored this progress: the 2021 relaxation of the ROK-U.S. Missile Guidelines and the establishment of U.S. Space Forces Korea (USSF-K) in December 2022.

Revisions of Missile Guidelines: South Korea's prominent progress in military space development is widely understood to have been driven by the decision to lift the ROK-U.S. Missile Guidelines. For decades, the guidelines capped the range and payload of South Korean missiles and rockets, constraining Seoul's ability to cultivate independent space launch capabilities. These limits forced South Korea to rely on external partners, predominantly Russia, for the development and launch of its early space vehicles, such as the Naro rocket (KSLV-I). This reliance extended to civil satellite missions until Russia's invasion of Ukraine in 2022 prompted Seoul to cancel several planned joint launches.²⁹⁾

The trajectory began to shift under President Moon Jae In with the July 2020 removal of solid-fuel restrictions for space launch vehicles marking a key milestone.³⁰⁾ The

28) Republic of Korea, *이재명정부 123대 국정과제* [Lee Jae Myung Government's 123 National Policy Tasks] (Republic of Korea, 2025), 53, 171-75.

29) Andrew Jones, "South Korea set to finalize cancellation of launch contracts with Russia," *Space.com*, October 12, 2023, <https://www.space.com/south-korea-cancel-launch-contracts-russia>.

30) Kelsey Davenport, "South Korea to Pursue Military Satellites," Arms Control Association, September 2020, <https://www.armscontrol.org/act/2020-09/news/south-korea-pursue-military-satellites>.

full termination of the missile guidelines came in May 2021, eliminating caps on missile range and payload and allowing South Korea to develop, produce, and possess solid-fuel space launch vehicles without limitation.³¹⁾ These reforms enable the expansion of both civil and defense space programs, creating ripple effects across the broader national space ecosystem.

Following the revision of the guidelines, DAPA emerged as a central player in South Korea's military space and industrial development became more prominent. Responding to the removal of the missile guidelines, DAPA initiated planning for its *Masterplan for the Development of Space Defense Business* in August 2021, which includes regulatory, technological, and industrial initiatives in collaboration with multiple government agencies and private-sector partners to transform South Korea into a defense space powerhouse by 2030.³²⁾ The plan, released in December 2021, commits over \$13.6 billion to priority programs including the deployment of reconnaissance satellites, military communication systems, and early warning satellites to detect and track North Korean missile launches.³³⁾ Averaging roughly \$1.5 billion per year, this figure substantially exceeds the \$700 million annual budget allocated to KASA in 2025.³⁴⁾ The Agency for Defense Development underneath DAPA also established the Defense Space Technology Center in June 2021, and underwent major restructuring in January 2025 to emphasize aerospace research, further consolidating the country's expanding defense-space capabilities.³⁵⁾

31) Brian Kim, "US lifts missile restrictions on South Korea, ending range and warhead limits," *Defense News*, May 25, 2021, <https://www.defensenews.com/global/asia-pacific/2021/05/25/us-lifts-missile-restrictions-on-south-korea-ending-range-and-warhead-limits/>.

32) Park Si-Soo, "South Korea to invest \$13.6 billion to bolster defenses capabilities in outer space," *SpaceNews*, August 19, 2021, <https://spacenews.com/south-korea-to-invest-13-6-billion-to-bolster-defenses-capabilities-in-outer-space/>.

33) Lee Hae-sung and Song Young-chan, "[단독] 정부, 우주방위 사업에 2030년까지 16조원 투자한다" [[Exclusive] Government to Invest 16 Trillion Won in Space Defense Projects by 2030], *The Korea Economic Daily*, December 28, 2021, <https://www.hankyung.com/article/202112289438i>.

34) Kim Na-young, "Space agency seeks 27% hike in 2025 budget," *Yonhap News Agency*, August 28, 2024, <https://en.yna.co.kr/view/AEN20240828002500320>.

35) Lee Seungjoo and Shin Sangwoo, "Evolution and Dynamics of the Space Industry in South Korea," *Asie. Visions*, no. 137 (2024), https://www.ifri.org/sites/default/files/migrated_files/documents/atoms/files/ifri_lee_shin_space_industry_south_korea_2024.pdf; Kim Tae-hoon, "A DD '7대 연구원 체제' 복귀... "우주항공 뜨고, 미사일 지고" [취재파일] [ADD Returns to '7-Research

USSF-K Operations and Integration: One of USSF-K's key missions is operating the Shared Early Warning System (SEWS), which provides allied forces with missile launch detection and warning information on North Korea.³⁶⁾ Using data collected from U.S. infrared satellite constellations, SEWS enables allies to jointly track ballistic missile launches and reentry vehicles with greater precision and speed than ground-based radars alone. In December 2023, South Korea, United States, and Japan, activated a trilateral agreement to share early warning data on North Korean missile launches. Through this framework, detection and identification data are shared in real-time among forces in the three countries via automated systems with integrated command-and-control networks.³⁷⁾

USSF-K also plays a vital role in training South Korean forces to conduct space warfighting operations. The ROK Air Force (ROKAF)'s Space Operations Group serves as their primary counterpart. In April 2024, the ROK Space Operations Squadron and USSF-K conducted comprehensive joint training under Korea Flying Training.³⁸⁾ Simulated scenarios leveraging U.S. military satellite data enabled allied forces to share targeting information and included discussions on integrating South Korean reconnaissance satellites for future operations.

The USSF-K's role also includes integrating unclassified commercial capabilities into the fold of joint and combined space operations, exemplified by the Polaris Hammer-Korea exercise held in 2025. The second phase in March 2025 utilized both commercial and defense technologies, including the establishment of the Combined Joint Space Operations Center (CJSpOC), a forward-operating command-and-control

Institute System'... "Aerospace Rising, Missiles Declining" [Investigation File], *SBS News*, February 4, 2025, https://news.sbs.co.kr/news/endPage.do?news_id=N1007969857.

36) Michael Lee, "USFK to run space-based early warning system with allies," *Korea JoongAng Daily*, June 6, 2023, <https://koreajoongangdaily.joins.com/2023/06/06/national/defense/Korea-USFK-United-States-Space-Forces-Korea/20230606153731861.html>.

37) Lee Sang-min, "주한미군 '한미일 북 미사일정보 공유'에 '주한 미 우주군' 역할 중요" [USFK: 'US Space Force in Korea' Plays Key Role in US-ROK-Japan North Korean Missile Information Sharing], May 26, 2023, Radio Free Asia, https://www.rfa.org/korean/in_focus/nk_nuclear_talks/nknuclear-05262023135330.html.

38) Kim Eun-jung, "S. Korea, U.S. stage space training against N.K. GPS jamming threats," *Yonhap News Agency*, April 24, 2024, <https://en.yna.co.kr/view/AEN20240424004500315>.

hub.³⁹⁾ This exercise integrated commercial capabilities, including SpaceX Starshield terminals and tactical surveillance programs. The Joint Commercial Operations (JCO) cell, a multinational initiative under U.S. Space Command tasked with integrating commercial space services, also provided CJSpOC commercially augmented military space surveillance capabilities at an unclassified level.

Institutional Coordination Framework

The ROK-U.S. alliance operates through a three-tiered defense policy coordination structure for space security: the annual Security Consultative Meeting at the ministerial level sets strategic priorities; the biannual Korea-U.S. Integrated Defense Dialogue at deputy minister level serves as an umbrella mechanism; and the director general-level Space Cooperation Working Group addresses technical and operational details. Both sides have identified space as a priority policy domain, most notably affirming at the October 2024 2+2 Meeting that “cyberattacks and attacks to, from, or within space could lead to the invocation of Article III of the Mutual Defense Treaty.”⁴⁰⁾

The formal restart of the ROK-U.S. Civil Space Dialogue in 2022 (following a six-year hiatus) greatly expanded policy discussions to include space exploration, governance, industry, and supply chain cooperation.⁴¹⁾ Both sides agreed to establish the ROK-U.S. Working Group on Export Controls, institutionalizing coordination on satellite-related licensing and export facilitation.⁴²⁾ Regulatory reforms in the United

39) Noah Tancer, “Space Forces - Korea stands up first forward operating CJSpOC in support of FS25,” U.S. Space Force, March 21, 2025, <https://www.spaceforce.mil/News/Article-Display/Article/4131474/space-forces-korea-stands-up-first-forward-operating-cjspoc-in-support-of-fs25/>.

40) “U.S.-Republic of Korea Security Consultative Meeting and 2+2 Ministerial Dialogue Fact Sheet,” U.S. Department of Defense, October 30, 2024, <https://www.war.gov/News/Releases/Release/Article/3951270/us-republic-of-korea-security-consultative-meeting-and-22-ministerial-dialogue/>.

41) “「제3차 한미 민간우주대화」 개최” [Hosting 「3rd ROK-US Civil Space Dialogue」], Ministry of Foreign Affairs, Republic of Korea, December 16, 2022, https://www.mofa.go.kr/www/brd/m_4080/view.do?seq=373172.

42) “Joint Statement from the Governments of the United States of America and the Republic

States created a more favorable environment for alliance-based space cooperation: in March 2023, the U.S. Department of Commerce eased satellite-related export restrictions for Missile Technology Control Regime partner countries, including South Korea.⁴³⁾ The Civil Space Dialogue also emphasizes joint applications for maritime domain awareness, with both countries committed to leveraging space-based data to enhance Indo-Pacific maritime security and deepening trilateral ROK-U.S.-Japan civil and commercial space cooperation initiatives.

5. Opportunities for Cooperation

The following recommendations are organized by strategic policy objectives, which draw on institutional frameworks already in place to advance concrete joint capabilities by the 2030s.

1) Clarifying Military Space Command Authority and Institutional Governance

South Korea's space operational capabilities are expanding rapidly, but fragmented governance structures and unclear legal frameworks addressing space security-related space activities is inhibiting comprehensive strategic thinking. The *Space Development Promotion Act* of 2005 established South Korea's foundational governance framework for national space policy and technological advancement, centered on five-year planning cycles under the *Basic Plan for the Promotion of Space Development* (or the Basic Plan).⁴⁴⁾ For instance, the act's most recent

of Korea at the United States-Republic of Korea Civil Space Dialogue," U.S. Department of State, April 14, 2025, <https://www.state.gov/joint-statement-from-the-governments-of-the-united-states-of-america-and-the-republic-of-korea-at-the-united-states-republic-of-korea-civil-space-dialogue>.

43) The regulations applied to all but the original MTCR signatories: US, Canada, France, Germany, Italy, Japan, the United Kingdom and India, which was exempt in 2005; Theresa Hitchens, "Commerce eases satellite exports to MTCR partners: South Korea a key focus," *Breaking Defense*, March 16, 2023, <https://breakingdefense.com/2023/03/commerce-eases-satellite-exports-to-mtcr-partners-south-korea-a-key-focus/>.

44) "Selected Examples of National Laws Governing Space Activities: Republic of Korea," United Nations Office for Outer Space Affairs, accessed October 18, 2025, https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/republic_of_korea/space_development_promotio

iteration, the Fourth Basic Plan (2023-2027), outlines strategic priorities for consolidating South Korea's structured space development system, such as enhancing public-private collaboration and strengthening satellite and launch capabilities.⁴⁵⁾ However, the law was originally developed for an era emphasizing research and development; space has since become essential to national defense and alliance management, demanding urgent adaptation of South Korea's legislative and institutional frameworks.

These issues are evident in the challenges faced by the National Space Council, chaired by the President and intended as the highest-level space policy body. The establishment of the Security Space Development Working Committee within the National Space Council in October 2022—co-chaired by the Deputy Minister of National Defense and the Deputy Director of the National Intelligence Service—laid an important foundation for strengthening defense space coordination.⁴⁶⁾ Nonetheless, the Council's multiple working committees—the Space Development Promotion Working Committee, Satellite Information Utilization Working Committee, and Security Space Development Working Committee—operate largely independently.⁴⁷⁾ Communication gaps remain pervasive, not only between ministries such as the MND, MSIT, and the Ministry of Foreign Affairs (MOFA), but even among officials from the same ministry serving on different subcommittees. This fragmented structure limits the government's ability to implement integrated and coherent space policy.

ns_actE.html.

45) Ministry of Science and ICT et al., *제4차 우주개발진흥기본계획* [4th Basic Plan for the Promotion of Space Development] (Republic of Korea, 2022), <https://www.stepi.re.kr/skin/doc.html?fn=10729615e7776a0091100f79d7a9ac34&rs=/preview/html/202510>.

46) Park Eung-jin, “국방우주위원장 ‘차관→장관’ 격상… “국방우주력 발전 강화” [Defense Space Committee Chairman Position Elevated from ‘Vice Minister’ to ‘Minister’… “Strengthening Military Space Power”], News1, June 3, 2022, <https://www.news1.kr/diplomacy/defense-diplomacy/4701087>; Hong Jae-sung, “국방부·국정원, 첫 안보우주개발실무위…위성개발 계획 등 논의” [Ministry of National Defense and National Intelligence Service Hold First Security Space Development Working Committee Meeting…Discuss Satellite Development Plans], October 7, 2022, *Yonhap News Agency*, <https://www.yna.co.kr/view/AKR20221007101100504>.

47) Interview with Korean space policy experts, interview by author, Republic of Korea, September 2025

KASA's position under MSIT further limits cohesive governance. Because it is not directly under presidential authority, KASA lacks clout to act as a central coordinating agency. Turf disputes and MSIT's tight control over national space programs have hindered broader strategic integration—restricting MOFA's ability to frame space in support of regional objectives and MND's efforts to push for dual-use defense capabilities.⁴⁸⁾ These structural and bureaucratic divides have direct implications for alliance cooperation. Persistent disputes have delayed initiatives such as the Civil Space Dialogues, leaving U.S. counterparts uncertain about Seoul's strategic intentions and operational timelines.

The *Act on the Organization of National Armed Forces* lacks clear provisions assigning space operations authority to any military service.⁴⁹⁾ Interservice rivalry and civilian agency concerns have stalled proposals to designate the Air Force as the leading service for space operations, limiting progress toward developing joint doctrine and advanced operational capabilities with USSF-K.

Recommendation: South Korea should amend the *Act on the Organization of National Armed Forces* designating the ROKAF as the lead service for space operations and establish a dedicated Space Operations Wing by 2030. Simultaneously, Seoul should revise the *Space Development Promotion Act* to enact a comprehensive *Basic Space Act*, which will integrate civilian and defense activities under a unified framework and establish a centralized coordinating body directly under presidential authority. Legislative amendments for the *Act on the Organization of National Armed Forces* should establish the ROKAF as the lead service to enable independent mission conduct and integrated capability development while improving personnel retention, enhancing operational expertise and training.

These reforms would clarify objectives, improve transparency with U.S. counterparts,

48) Ibid.

49) Lee Hyun-ho, “우주전략사령부 창설?...軍 조직법에 ‘우주작전’ 단어부터 넣자[이현호의 밀리터리!톡]” [Establishing a Space Strategy Command?...Start by Adding the Term ‘Space Operations’ to the Military Organization Act], *Seoul Economic Daily*, July 10, 2025, <https://www.sedaily.com/NewsView/2GVAMKDZGI>.

enable independent mission conduct, and ensure cohesive coordination with allied partners. In the interim, Seoul could take incremental steps to improve transparency and coordination. Publicly releasing a declassified version of the Ministry of National Defense's *Defense Space Strategy* would clarify objectives and build allied confidence. Institutionalizing structured consultation mechanisms between DAPA and private industry could further align defense acquisition priorities with commercial capabilities.

2) Establishing Personnel Exchanges and Expanding Access to Advanced Training

As South Korea fields an expanding portfolio of military space assets, it requires comprehensive expertise to operate advanced systems and integrate space domain awareness into joint operations. These capability gaps reflect the lack of established service culture, unclear career progression, and limited multilateral space engagement opportunities. Moreover, the absence of a dedicated personnel pipeline threatens the sustainability of South Korea's emerging space operations cadre precisely when adversaries are rapidly advancing their own space capabilities.

Classification restrictions and complex U.S. defense space structures limit allied access to advanced training and expertise. Although South Korea has sought greater U.S. support for advanced education and practical training across all services, security classification constraints remain the primary barrier to professional development. The U.S. DOD's National Security Space Institute (NSSI)—the principal space professional education organization—offers a tiered curriculum composed of Space 100, Space 200, and Space 300 courses.⁵⁰⁾ However, advanced courses (Space 200 and 300) are restricted to Five Eyes personnel due to classification constraints, reflecting Cold War-era compartmentalization practices that continue to impede allied interoperability. As of July 2025, South Korea lacks a formal personnel exchange agreement with U.S. Space Command, a critical gap given the accelerating pace of technological change and operational integration requirements.⁵¹⁾

50) For more detailed information on NSSI's educational structure and course offerings, see National Security Space Institute, *U.S. Space Force National Security Space Institute*, accessed October 18, 2025, <https://nssi.spaceforce.mil/>.

Recommendation: The U.S. could help South Korea establish a domestic training pipeline tailored to its evolving space threat environment, particularly focused on North Korean and regional contingencies. Such an initiative would help overcome classification barriers and support the development of a self-sustaining space operations cadre. The United States could further leverage the NSSI's Mobile Education Teams (METs), which have provided in-country training in South Korea, such as delivering the Space 100 course at Camp Humphreys.⁵²⁾ Expanding unclassified courses—such as the Coalition Space Course, Orbital Warfare 100, and Fundamental Application of Space Targeting Course—would strengthen allied space operations expertise and establish shared operational languages.

Furthermore, embedding South Korean officers in U.S. space components while addressing foreign disclosure staffing gaps would deepen operational familiarity and strengthen allied participation in space planning. Given the shortage of U.S. space personnel supporting allies, Seoul could also consider placing exchange officers at forward-deployed U.S. bases or regional facilities rather than those in the continental United States, providing more direct human support and integration opportunities. This phased approach would allow South Korea to build institutional capacity while contributing meaningfully to allied space operations from the outset.

3) Integrating South Korea into Multilateral Space Defense Exercises

South Korea remains only partially integrated into U.S.-led multilateral space defense activities like the biannual Schriever Wargames and Combined Space Operations (CSpO) Initiative. South Korea has participated in Global Sentinel (an annual U.S. Space Command-led exercise) since 2017, but Global Sentinel's emphasis on data-sharing offers limited operational depth compared to advanced exercises

51) U.S. Government Accountability Office, *Space Operations: DOD Is Pursuing Efforts to Collaborate with Allies and Partners but Needs to Address Key Challenges*, GAO-25-108043 (Washington, DC: U.S. Government Accountability Office, 2025), 12-14, <https://www.gao.gov/products/gao-25-108043>.

52) National Security Space Institute, "Annual Report: Academic Year 2024 (Oct 2023 to Sep 2024)," National Security Space Institute, accessed October 18, 2025, 20, https://nssi.spaceforce.mil/section/nav-unitinfo/about/files/AY24_Annual_Report-v1.2.4_compressed.pdf?v1.

emphasizing joint decision-making and contested environment operations.⁵³⁾ Although the 2025 Schriever Wargame was conducted without South Korean participation, defense officials noted that Seoul had secured key space capabilities and was in final stages of joining under the Biden administration.⁵⁴⁾ However, the Trump administration has paused discussions pending new DOD strategic directives, creating an opening to reassess South Korea's strategic value within the exercise framework.

Recommendation: South Korean participation in the 2027 Schriever Wargame should be prioritized under the DOD's strategic review. Such delays are problematic because the 2027 Schriever Wargame will be the first to be jointly planned with allied input rather than set unilaterally by the U.S. Space Force.⁵⁵⁾ South Korean participation is essential to capture region-specific threats—including Taiwan and Korean Peninsula contingencies—and integrate North Korea's evolving space capabilities into exercise planning and scenario development. South Korea's geographic position and threat environment make its operational insights invaluable to improving exercise realism and allied preparedness.

Additionally, the United States should expand JCO vendor participation to include approved South Korean firms as commercial partners. This would especially benefit the JCO Indo-Pacific cell by fostering a robust regional ecosystem and deepening military-commercial collaboration. Utilizing commercial sources in military operations can improve operational resilience and data reliability by eliminating the need to navigate restrictive classification barriers. This approach simultaneously

53) USSTRATCOM Public Affairs, "USSTRATCOM plans and policy director visits Republic of Korea Space Operations Center," U.S. Strategic Command, January 25, 2017, <https://www.stratcom.mil/Media/News/News-Article-View/Article/1060262/usstratcom-plans-and-policy-director-visits-republic-of-korea-space-operations/>.

54) Interview with Korean space policy experts, interview by author, Republic of Korea, September 2025.

55) Theresa Hitchens, "2025 Schriever space wargame last to be planned unilaterally by US," *Breaking Defense*, August 19, 2025, <https://breakingdefense.com/2025/08/2025-schriever-space-war-game-last-to-be-planned-unilaterally-by-us/>.

energizes South Korea's domestic defense space industry, fostering a more integrated ecosystem that adds resilience against space aggression.

4) Establishing Trilateral ISR and SDA Data Sharing with Japan

China's expanding regional assertiveness is pushing South Korea into closer coordination with Japan through a deepening trilateral security partnership that increasingly includes cooperation in space security.⁵⁶⁾ The activation of the real-time trilateral North Korean missile warning data sharing agreement marked a watershed moment for regional space security cooperation by promising pathways forward for deeper integration. However, systematic real-time sharing of high-resolution satellite imagery has yet to be implemented, leaving critical gaps in coverage for tracking mobile and emerging threats. The bilateral General Security of Military Information Agreement (GSOMIA) between South Korea and Japan provides a framework for intelligence sharing, but in practice it has not been fully extended to include satellite imagery, limiting its effectiveness in tracking North Korea's mobile missile threats.⁵⁷⁾

South Korea's current SDA capabilities rely solely on the ROKAF's EOSS (Electro-Optical Satellite Surveillance System), which employs ground-based optical telescopes with inherent limitations in coverage, persistence, and adverse weather conditions. By contrast, South Korea's other satellite surveillance systems remain scheduled for deployment before 2040, creating a clear and strategically consequential near-term capability gap that threatens deterrence effectiveness during the critical window when adversarial capabilities are advancing most rapidly. Bridging this gap calls for immediate trilateral cooperation, with the United States and Japan providing interim support until South Korea's indigenous systems achieve operational maturity.

56) Woo Jongseok, "Sino-US rivalry and South Korea's strategic choice for security and space policy: a neoclassical realist perspective," *Asian Security* 21, no. 1 (2025): 60-66, <https://doi.org/10.1080/14799855.2025.2483176>.

57) Interview with Korean space policy experts, interview by author, Republic of Korea, September 2025.

Recommendation: Resume the suspended Trilateral Dialogue on Space Security to advance two concrete initiatives: (1) Trilateral geospatial data sharing from ISR satellites to address North Korean missile threats, leveraging Japan's Information Gathering Satellite (IGS) constellation of 11 reconnaissance satellites as complementary to South Korea's Project 425 satellites.⁵⁸⁾ (2) Establish a trilateral SDA data-sharing framework allowing South Korea to benefit from shared awareness through 2040 while positioning it to contribute more actively once its national capabilities are fully fielded. The U.S. should provide real-time satellite imagery and data processing/analysis capabilities, potentially through commercial solutions to overcome classification barriers.

Clear assurances from Washington and Tokyo should directly address Seoul's concerns about potential Chinese retaliation—a legitimate concern rooted in historical experience during the 2016 Terminal High Altitude Area Defense (THAAD) system deployment. When South Korea agreed to host the U.S.'s THAAD to establish an upper-tier layer of defense against North Korean ballistic missile threats, Beijing opposed the decision on the grounds that the radar could be repurposed to monitor Chinese airspace, viewing the system through a great-power competition lens.⁵⁹⁾ Beijing's subsequent economic retaliation on South Korea imposed significant costs on Seoul, demonstrating the potential price of visible alignment with U.S. defense initiatives.

Trilateral space cooperation faces similar political sensitivities rooted in the dual-use nature of space surveillance technologies. For instance, the enduring gaps in U.S.'s SDA coverage across the Indo-Pacific stem from Cold War-era architectures designed primarily for Soviet missile tracking rather than comprehensive space monitoring.⁶⁰⁾

58) Robert Cheetham, "JEO 5 - JMoD Goes Shopping," *Japan Earth Observer*, May 12, 2025, <https://www.japanearthobserver.com/jeo-5-jmod-goes-shopping/>.

59) Hyonhee Shin, "South Korea, China clash over U.S. missile shield, complicating conciliation," *Reuters*, August 11, 2022, <https://www.reuters.com/world/asia-pacific/skorea-says-thaad-missile-system-is-means-self-defence-news1-2022-08-11/>.

60) Brian Weeden, Paul J. Cefola, and Jaganath Sankaran, "Global Space Situational Awareness Sensors," paper presented at Advanced Maui Optical and Space Surveillance Technologies Conference (AMOS), Maui, Hawaii, 14-17 September 2010, 5, https://gotech.spp.umd.edu/sites/default/files/2019-07/amos_jaganath.pdf.

Clear assurances from Washington and Tokyo should address Seoul's concerns about potential Chinese retaliation, and should explicitly frame SDA cooperation as defensive in purpose and scope.

5) Regional Space Architecture Integration

The Indo-Pacific region is witnessing the emergence of multilateral security frameworks—such as the Quad and AUKUS—that have incorporated space cooperation into their broader security agenda. As South Korean ISR satellites, SATCOM networks, and SDA systems mature, Seoul should actively position its emerging space capabilities as contributors to broader regional security frameworks, serving as critical enablers for Indo-Pacific's collective deterrence. Proactive engagement also yields significant benefits for technology transfer, improved interoperability, and strengthened supply chain resilience.⁶¹⁾ However, it will take time for South Korea to build up such capabilities, and how they fit into broader regional architectures remains uncertain. Without careful coordination, there is a risk of creating redundant systems rather than complementary, integrated capabilities.

South Korea can begin reducing its current limitations through payload hosting arrangements, which involve carrying allied payloads aboard its satellites. These arrangements yield tangible benefits for the United States and its partners by lowering launch and operational costs. Shared payloads also reinforce collective deterrence, as an attack on one partner's satellite would inherently implicate allied systems, raising the costs of space aggression across the region. Japan's QZSS-HP (Quasi-Zenith Satellite System-Hosted Payload) program provides a proven precedent for integrating U.S. SDA payloads on allied geostationary satellites, demonstrating how extended platform lifespans and stable orbital positions can strengthen regional space surveillance.⁶²⁾

61) Byun Chongsoo et al., "Developing the Direction of Military Space Capabilities in South Korea," *Journal of Indo-Pacific Affairs* 6, no. 4 (2023): 108-109, https://media.defense.gov/2023/Jun/14/2003241443/-1/-1/1/04%20BYUN%20ET%20AL_VIEW.PDF/04%20BYUN%20ET%20AL_VIEW.PDF.

Persistent classification barriers and bureaucratic compartmentalization continue to hamper timely cooperation. While the MND and DAPA have expressed intent to pursue payload hosting for SDA missions, security restrictions have slowed technical exchanges and created opportunity costs as adversaries advance.

Meanwhile, the U.S. Department of Defense is shifting from small numbers of high-value satellites toward proliferated, multi-orbit constellations designed to meet early warning and missile tracking requirements. As proliferated satellite constellations expand opportunities for regional deterrence, Seoul will have multiple entry points for participation, contributing to a more resilient collective defense posture and stronger trilateral coordination.⁶³⁾ However, these entry points also introduce new layers of technical uncertainty that require coordinated planning. Looking ahead, the potential integration of missile defense cooperation into President Trump's envisioned "Golden Dome" architecture will demand even deeper allied coordination and technical alignment to ensure seamless integration of South Korean systems into future regional frameworks.

Recommendation: The U.S. and South Korea should establish an "Allied by Design" approach to regional space architecture integration.⁶⁴⁾ This requires integrating allied participation early in program planning to identify complementary capabilities and reduce delay and establishing clear communication channels with explicit timelines for resolving foreign disclosure restrictions. Additionally, Washington and Seoul should establish a dedicated Missile Defense Consultative Group, potentially as a subgroup under existing working structures such as the SCWG, focused on

62) Space Systems Command and Space Operations Command, "Space Systems Command, Japan launch first bilateral space effort," February 5, 2025, U.S. Space Force, <https://www.spaceforce.mil/news/article-display/article/4055022/space-systems-command-japan-launch-first-bilateral-space-effort/>; Anne McGovern, "New optical sensing system will improve space domain awareness," *MIT News*, June 5, 2025, <https://news.mit.edu/2025/new-optical-sensing-system-will-improve-space-domain-awareness-0605>.

63) Léonie Allard and Jean-Loup Samaan, "Golden Dome creates a new missile defense bargain with US partners," Atlantic Council, May 21, 2025, <https://www.atlanticcouncil.org/blogs/new-atlanticist/golden-dome-creates-a-new-missile-defense-bargain-with-us-partners/>.

64) McClintock et al., *Allied by Design*, 97-98.

ensuring effective integration of South Korean systems into future U.S. missile defense architecture.⁶⁵⁾ This mechanism would help both sides to systematically evaluate North Korea's rapidly diversifying missile portfolio and identify the most effective allocation of allied space efforts for fit for the distinct strategic landscape of the Korean peninsula.

Appendix 1: South Korea's Military Space Capabilities

Capability	Current Status	Target Completion	Key Purpose	Orbital Regime
Project 425 (ISR)	4 synthetic aperture radar + 1 optical satellite operational by end 2025	Completed in 2025	Revisiting Korean peninsula every ~2 hours, provides high spatial resolution	Low Earth Orbit (LEO)
Microsatellite Constellation (ISR)	Planning phase	~60 micro- and small-satellites by 2030	Aims to revisit Korean peninsula every ~30 minutes, lower spatial resolution than Project 425 satellites	LEO
ANASIS (SATCOM)	ANASIS-II operational (2020);	Follow-up with ANASIS-III by 2035	Secure and resilient stand-alone military communications,	Geostationary orbit
KPS (PNT)	First satellite launches Sep 2029	Full 8-satellite constellation by 2035	Regional PNT alternative for GPS that provides higher accuracy; covers Southeast Asia and Australia; enables autonomous vehicles	Geostationary orbit
Early Warning Satellite	Under development	Early 2030s deployment	Detect infrared signals from ballistic missile launches	TBD, likely Geostationary orbit
SDA Systems	Ground-based EOSS telescope (2022)	SDA laser and radar stations by 2040	Track orbital objects and satellite maneuvers, laser systems can be used as soft-kill ASAT to dazzle adversarial satellite sensors	Ground-based

65) Patrick M. Cronin, *Strategic Alignment in an Era of Uncertainty: Next Steps for the US-South Korea Alliance* (Washington D.C.: Hudson Institute, 2025), 28-29, <https://www.hudson.org/security-alliances/strategic-alignment-era-uncertainty-next-steps-us-south-korea-alliance-patrick-cronin>.

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IV. Modernizing the ROK-U.S. Alliance in the Age of Nuclear Latency

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1. Introduction

South Korea, together with Japan, has long served as a cornerstone of U.S. strategic posture in the Indo-Pacific. Today, approximately 80,000 U.S. troops are stationed in the region - the largest overseas deployment - underscoring the enduring centrality of the two alliances. Yet as the regional balance shifts in response to an increasingly assertive China, Russia's persistent aggression in Ukraine, and North Korea's advancing nuclear capabilities, the credibility of U.S. extended deterrence faces renewed scrutiny.

As doubts about U.S. nuclear assurance deepen, South Korea has increasingly shown support for both the return of U.S. tactical nuclear weapons and the indigenous nuclear development. According to the Asan Institute's 2025 survey, 76.2% of respondents supported the idea that South Korea should develop its own nuclear weapons, the highest level recorded since the institute began polling on the issue in 2010.¹⁾ South Korea is a textbook example of a nuclear latency state: while formally committed to the Nuclear Non-Proliferation Treaty (NPT), it possesses advanced nuclear infrastructure and fissile material capabilities that could support rapid weaponization. Historically, such latent capabilities have been viewed with suspicion, often interpreted as veiled threats of proliferation or signs of alliance decay. However, recent developments - including deepening institutional mechanisms between Seoul and Washington, evolving threat perceptions, and rising energy security demands - raise a new question: Under what conditions can nuclear latency function as a stabilizing asset within an asymmetric alliance, rather than a source of alliance erosion?

This paper argues that nuclear latency, when guided by strategic rationale and

1) The Asan Institute for Policy Studies, "South Koreans and Their Neighbors 2025," April 28, 2025, <https://www.asaninst.org/contents/south-koreans-and-their-neighbors-2025/>.

institutional safeguards, can serve as a constructive tool for alliance adaptation. Rather than asking whether allies hedge, the central puzzle lies in how such behavior is managed – whether it exacerbates alliance fissures or is strategically incorporated into alliance design. South Korea offers an especially instructive case: it possesses latent nuclear capabilities, remains bound by a strict 123 Agreement, and faces rising pressure to modernize its energy infrastructure. Simultaneously, it operates within an increasingly institutionalized alliance framework that includes mechanisms for enforcement, consultation, and nuclear coordination.

Drawing on theoretical insights from deterrence and hedging literature, the paper employs a process-tracing approach, combining historical analysis with secondary survey data to assess shifting perceptions of threat and assurance in South Korea. It shows that public sentiment has shifted away from North Korea as the sole security concern and toward broader structural anxieties involving both China and the United States. In this context, the alliance must reimagine deterrence – not only in military terms, but in technological and institutional dimensions. By integrating allied latent capabilities into a modernized strategic framework, the ROK-U.S. alliance can enhance deterrence credibility, reduce proliferation incentives, and reinforce regional stability.

2. Latent Deterrence and Strategic Hedging

Extended deterrence originated from the belief that defending allied states is as equally important to national interests as defending the homeland itself. This concept rests on the idea that the credibility of deterrence derives not solely from military capability but also from psychological assurance. As Patrick M. Morgan (1985) noted, deterrence is “undoubtedly a psychological phenomenon.”²⁾ This psychological dimension extends beyond the dyadic interaction between the defender and the attacker; it also plays a critical role in shaping the relationship between the defender and its protégés. Thomas Schelling famously captured this nuance through the idea

2) Patrick M. Morgan, “Saving Face for the Sake of Deterrence,” in *Psychology and Deterrence* (JHU Press, 1985).

of *dying with dignity*, referring to the idea that once U.S. forces suffer casualties while defending their allies, it acts as a tripwire by immediately drawing the United States into the battlefield.³⁾ In other words, forward military presence functions not merely as a warfighting asset but as an assurance mechanism.

However, assurance is inherently plagued by a credibility problem. Once the protégé is attacked, the defender is not suffering yet and, in fact, the defender has a choice of not to defend. This structural condition breeds skepticism on the part of the protégé, who must always consider the possibility of abandonment in a real crisis. In this sense, extended deterrence operates on a continuum of uncertainty where assurance is always questioned and seldom fully believed.

This dilemma has become more acute in recent years. The unpredictability of U.S. leadership, the security lessons drawn from the Ukraine crisis, and the intensification of great power competition have collectively heightened anxieties among allies. These concerns are particularly pronounced in the case of South Korea, which possesses advanced nuclear technologies and the technical capacity to produce fissile materials relatively quickly.

This condition is commonly called nuclear latency – defined as the possession of technological, industrial, and material resources that would allow a state to develop nuclear weapons in a relatively short period, even if it has not yet done so. This state of readiness broadens the traditional understanding of what it means to be a nuclear power. Rather than a binary classification of nuclear versus non-nuclear states, latency introduces a spectrum in which states can engage in strategic ambiguity. As Schelling (1976) observed, nuclear capability should be understood “not with a yes or a no but with a time schedule.”⁴⁾ Volpe (2023) expands this idea by conceptualizing nuclear hedging as the deliberate effort by states to remain technologically prepared for nuclear weaponization while refraining from actual

3) Thomas C. Schelling, *Arms and Influence*, Veritas paperback edition, (Yale University Press, 2020).

4) Thomas C. Schelling, “Who Will Have the Bomb?,” *International Security* 1, no. 1 (1976): 77-91, <https://doi.org/10.2307/2538578>. 79.

development.⁵⁾

Hedging is commonly perceived as a slippery slope toward proliferation and, by extension, as a symptom of alliance erosion. Yet this view overlooks the possibility that hedging can serve as an adaptive strategy within asymmetric alliance structures. When managed through institutional mechanisms, hedging may create opportunities for both the defender and the protégé to recalibrate commitments, clarify expectations, and reduce uncertainty.

According to Volpe (2023), the effectiveness of hedging as a bargaining strategy within an alliance context depends on several interrelated factors.⁶⁾ First, the challenger – in this case, South Korea – must credibly signal both the willingness to pursue nuclear weapons and the readiness to suspend or reverse course if sufficient reassurance or policy adjustment is offered by the defender. Second, domestic audiences significantly influence the decision to pursue the hedging behavior. Leaders must consider not only international implications but also how nuclear hedging is perceived by domestic audiences in terms of legitimacy, risks, and national identity. Third, greater technological latency does not always translate into greater bargaining advantages. Without credible political intent and strategic signaling, technological capability alone cannot compel concessions. States perceived as more vulnerable in their security environment are often seen as more likely proliferators, regardless of their technological advancement. Finally, hedging tends to be most effective when the defender's enforcement costs remain limited.

In short, nuclear latency does not inherently signal the erosion of alliance credibility. Under certain conditions, it represents a strategic recalibration aimed at managing persistent uncertainty. In the case of the ROK-U.S. alliance, increasingly institutionalized mechanisms appear capable of accommodating these dynamics without fundamentally destabilizing the relationship. The following sections examine public sentiment and threat perception in South Korea to assess whether the

5) Tristan A. Volpe, *Leveraging Latency: How the Weak Compel the Strong with Nuclear Technology* (Oxford University Press, 2023).

6) Ibid.

conditions that facilitate hedging behavior – particularly domestic threat perceptions and the legacy of nuclear latency that has influenced enforcement mechanisms – are reflected in the current dynamics of the ROK-U.S. alliance.

3. Korea's Threat Perceptions

A survey conducted by East Asia Institute in June 2025 offers key insights into South Korea's public threat perceptions.⁷⁾ When asked to identify up to two of the most immediate threats to Korea's national security, the top three concerns were: (1) strategic competition and conflict between the U.S. and China (64.9%), and (2) rise of protectionism and competition in advanced technologies (59.8%). Notably, the leading concern in the previous year was climate change and environmental issues (51.2%) followed by North Korea's nuclear and missile threats (51.1%). This shift is particularly striking given that concern over "North Korea's nuclear and missile threats" fell sharply to 33.2%, even as North Korea remained the top-ranked country when respondents were asked which countries pose the most significant military threat to South Korea. The findings suggest that perceived threats stemming from the coercive behavior of the two dominant powers, the United States and China, have intensified to such an extent that North Korea's nuclear and missile capabilities are increasingly overshadowed and deprioritized among the South Korean public.

This pattern coincides with another notable shift in public perception. In response to the question about which country poses the most significant military threat, the proportion of respondents identifying the United States nearly doubled from 8.7% to 15.4 %, despite having consistently remained in the single digits in previous years. Japan continued to be viewed as the fourth most significant military threat, although its percentage dropped.

If a new nuclear weapons state were to emerge, South Korea is often regarded as the most likely candidate. This is not surprising given that South Korea faces not only the persistent threat from North Korea but is also surrounded by neighbors

7) EAI, "2025 EAI Public Opinion Poll on East Asia," 2025, <https://kaisnet.or.kr/>.

with whom it has experienced historical animosities. This broader regional context helps explain why all four, including Japan, ranked highly in South Korea's perceived security threats – highlighting a distinctive feature of South Korea's security dilemma.

4. History of Latency

During the authoritarian era (1961-1979) under President Park Chung Hee, South Korea secretly pursued a nuclear weapons program – known as Project 890. This initiative emerged from a profound sense of insecurity, driven by fears of a militarily and economically stronger North Korea and a growing perception of potential abandonment by the United States. This period coincided with the Vietnam war. Four years prior to the U.S. withdrawal from Vietnam in 1973, President Nixon articulated the Guam doctrine (also known as Nixon doctrine), stating that “problem will be handled by, and responsibility for it taken by, the Asian nations themselves.”⁸⁾ On July 5, 1970, Secretary of State William Rogers informed South Korea of the planned withdrawal of the 7th Infantry Division from Korea during a meeting of foreign ministers from seven nations involved in the Vietnam War. In fact, for the preceding six months, the United States had been steadily redeploying U.S. forces stationed in Korea to Vietnam without notifying the South Korean government.

In response to strong resistance from Seoul, President Nixon dispatched Vice President Spiro Agnew to South Korea as a special envoy on August 24. However, in a press interview during his flight from Seoul to Taiwan, Agnew remarked that “within the next five years, U.S. forces will be completely withdrawn from South Korea.”⁹⁾ Meanwhile, in February 1971, as preparations for the troop withdrawal were underway, President Nixon also announced the normalization of diplomatic relations with China. These developments further exacerbated Seoul's strategic anxiety and intensified President Park's determination to pursue self-reliant national

8) US State Department, Office of the Historian, “Document 29,” accessed April 13, 2025, <https://history.state.gov/historicaldocuments/frus1969-76v01/d29>.

9) Yong-sam Kim, “US 7th Division leaves Korea,” Future Korea, August 17, 2016, <http://www.futurekorea.co.kr/news/articleView.html?idxno=32090>.

defense, including the development of nuclear weapons and missiles.

This ambition was eventually stopped by then-Secretary of State Henry Kissinger, who reportedly threatened to terminate the U.S.-ROK alliance should South Korea move forward with nuclear development.¹⁰⁾ The seven-year gap between South Korea's signing of NPT in 1968 and its ratification in 1975 clearly exemplifies Park's reluctance to a definitive shutdown of covert nuclear development. Interestingly, this was when the U.S. tactical nuclear weapons remained on the Korean Peninsula.

During this time, the United States maintained a "neither confirm nor deny" (NCND) stance regarding the presence of tactical nuclear weapons in South Korea.¹¹⁾ Observing that Washington continued to provide advanced weaponry and substantial defense support to Israel despite suspicions of its nuclear weapons development, the South Korean officials mistakenly assumed that the United States would ultimately tolerate Korea's nuclear program and would maintain a similar NCND stance. This misperception is evident in a June 13, 1977 telegram from the U.S. Embassy in Seoul to the Department of State (declassified in 2019), in which Ambassador Sneider reported that he was "struck by evidence of ignorance at very senior Korean government levels of either costs or risks involved in the weapons development program."¹²⁾ Ultimately, faced with Kissinger's threat to end the alliance, the South Korean government concluded that pursuing nuclear weapons would seriously endanger its security relationship with the United States.

In retrospect, South Korea's early phase of nuclear latency was shaped less by technological aspiration than by exogenous factors: strategic uncertainty,

10) National Security Archive, "State Department Telegram 135500 to U. S. Embassy South Korea, 'ROK [Republic of Korea] Nuclear Fuel Regional Reprocessing Plans,' 10 June 1975, Secret," Declassified 2018, <https://nsarchive.gwu.edu/document/18396-national-security-archive-doc-02-state>.

11) Kyung-hoon Kang, "Roh Tae-woo's memoir, how did the declaration of denuclearization of the Korean Peninsula come about?," Voice of Korea, August 10, 2011, <https://vop.co.kr/A00000422407.html>.

12) National Security Archive, "U.S. Embassy Seoul Telegram 4890 to State Department, 'Nuclear Assurances to ROKG,' 13 June 1977, Secret, Excised Copy, under Appeal," Declassified 2019, <https://nsarchive.gwu.edu/document/18406-national-security-archive-doc-12-u-s-embassy..> 3.

misperception, and deep-seated fear of abandonment during a period of shifting U.S. commitments. The memory of that era underscores the importance of clear strategic signaling and the enduring relevance of credibility, not as one-way obligation from the defender, but as a reciprocal relationship between the defender and the protégé.

Unlike the 1970s, today's ROK-U.S. alliance is supported by a far more robust set of institutionalized enforcement and consultation mechanisms. South Korea remains strictly bound by the provisions of the 123 Agreement, governed by Section 123 of the U.S. Atomic Energy Act of 1954. This agreement includes explicit consent rights that give the United States legal authority to approve or deny reprocessing nuclear materials on a case-by-case basis. Compared to the more permissive arrangements with Japan, South Korea's agreement is considerably more restrictive. Japan, for instance, enjoys advance consent to reprocess spent fuel under its 1988 U.S.-Japan nuclear cooperation agreement.

The initial agreement signed between South Korea and the United States in 1974 reflected a clearly hierarchical relationship, as South Korea was entirely dependent on the United States for the import of reactors, nuclear fuel, and related equipment, making an unequal agreement almost inevitable.¹³⁾ When South Korea sought to construct a reprocessing facility in the mid-1970s, Washington pressured Seoul by threatening to suspend both economic aid and nuclear cooperation.¹⁴⁾ Washington's more cautious approach toward Seoul was also shaped by the international nonproliferation environment of the time, when global concerns over nuclear were especially salient.¹⁵⁾

The establishment of the Nuclear Consultative Group in April 2023 and the creation of a High-Level Bilateral Commission under the revised 123 Agreement in January 2025 have strengthened nuclear coordination channels more than ever before. South

13) Jin ho Jeon, 1970년대 한미 원자력협정 [The 1970s South Korea-U.S. Nuclear Cooperation Agreement: Focusing on the 1972 Agreement, Revised in 1974] (Seonin Munhwasa, 2023).

14) Ibid.

15) Ibid.

Korea's historical legacy, the presence of active consultation mechanisms, its firm commitment to nonproliferation norms, and the absence of any political signals suggesting an intent to proliferate, and most importantly, the continued strategic importance of U.S. forces stationed on the Korean Peninsula serve as strong constraints on nuclear ambition. Under these conditions, South Korea has little incentive to undertake actions that would put the legacy of the alliance at risk. This deepening of institutional infrastructure and mutual transparency mark a fundamental transformation: a shift from the mere hedging behavior for stronger assurance commitment from the defender to a more deliberate debate over the necessity of understanding latent deterrence amid evolving regional threats.

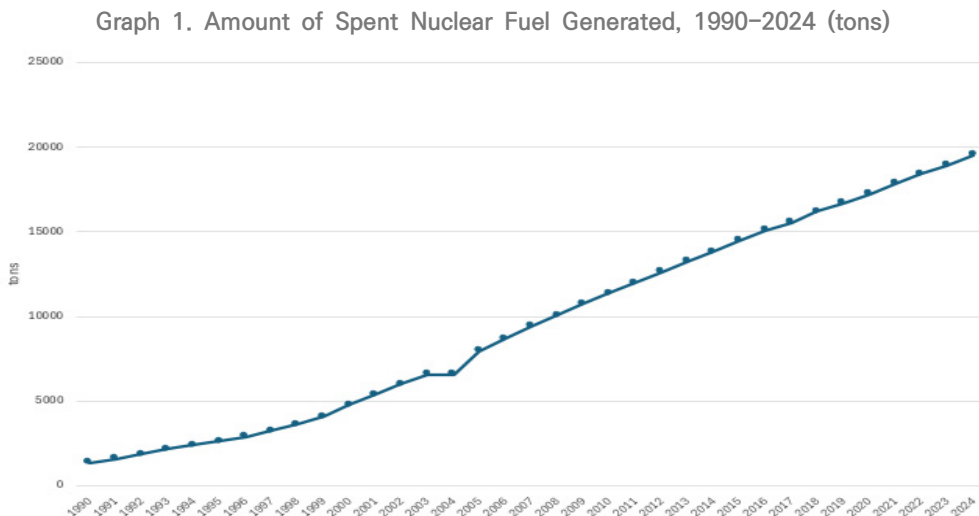
5. From Capability to Necessity

As of June 2025, South Korea operates 26 nuclear power reactors, with four more under construction. As demand for nuclear energy continues to grow, the volume of spent nuclear fuel is also increasing. As shown in Graph 1, the accumulated volume of spent nuclear fuel has nearly reached 20,000 tones, all of which is currently stored in cooling pools inside the power plants or in outdoor dry storage containers. At the current rate, storage facilities are expected to reach full capacity - beginning with the Hanbit nuclear power plant in 2030, followed by Hanul in 2031 and Kori in 2032.¹⁶⁾ Without viable solutions, South Korea could face a complete suspension of nuclear power plant operations within the next seven years. To reduce the volume of the wastes, the only currently available technology is reprocessing, which can reduce the amount of high-level radioactive waste by approximately 80 percent.¹⁷⁾ During the reprocessing stage, uranium and plutonium are separated. In modern reactors, separated plutonium is typically used to produce mixed-oxide (MOX) fuel.¹⁸⁾ However, because separated plutonium can also be used in nuclear weapons,

16) Korea Radioactive Waste Agency, "KORAD 2023 Winter Vol.110," accessed October 16, 2025, <http://220.89.204.238:8080/korad/202109/>.

17) World Nuclear Association, "Processing of Used Nuclear Fuel," August 23, 2024, <https://world-nuclear.org/information-library/nuclear-fuel-cycle/fuel-recycling/processing-of-used-nuclear-fuel>.

it poses a proliferation risk.



Source: author's reconstruction based on data from Statistics Korea¹⁹⁾

To comply with the 123 Agreement and reduce proliferation sensitivity, South Korea has prioritized the development of pyroprocessing – a high-temperature electrochemical treatment that precludes isolation of pure plutonium. Unlike conventional reprocessing, pyroprocessing recovers uranium and plutonium together with other actinides, thus rendering the output unsuitable for direct weaponization.²⁰⁾ From 2011, the Argonne and Idaho National Laboratories and the Korea Atomic Energy Research Institute conducted decade-long joint research. At the August 2025 U.S.-South Korea summit, agreement was reached to further discuss nuclear fuel reprocessing as part of bilateral cooperation.²¹⁾

The competitiveness and commercialization of pyroprocessing have been subjects

18) Ibid.

19) Ministry of Data and Statistics, “Spent nuclear fuel,” June 5, 2025, <https://www.index.go.kr/unity/potal/indicator/IndexInfo.do?popup=Y&clasCd=2&idxCd=5106#>.

20) Ibid.

21) Kenneth Luongo, “Reframing Nuclear Fuel Reprocessing Policy,” *The National Interest*, October 8, 2025, <https://nationalinterest.org/blog/energy-world/reframing-nuclear-fuel-reprocessing-policy>.

of ongoing political debate. However, it is difficult to deny that such study remains quintessential for managing the growing challenge of spent nuclear fuel worldwide. The United States is also grappling with the accumulation of spent nuclear fuel. In May 2025, President Trump issued four executive orders aimed at revitalizing American nuclear energy.²²⁾ As the AI industry expands, its demands for reliable sources of power to drive enormous data centers brought nuclear energy back into focus. Google has announced plans to generate 50 megawatts of nuclear power by 2030 - equivalent to the amount of energy needed to power a small town.²³⁾ Microsoft has also signaled its growing interest in nuclear energy by recently joining the World Nuclear Association.²⁴⁾ Amazon, as part of its broader net-zero strategy, announced plans to power its data centers in Virginia using small modular reactors (SMRs).²⁵⁾ The agreement was signed with South Korea's Doosan Enerbility and Korea Hydro & Nuclear Power Co., aiming to accelerate the deployment of new SMRs in the United States. To note, SMRs still produce spent nuclear fuel and other high-level radioactive waste that require long-term management, just like conventional reactors.

Above all, today's challenge is not simply whether South Korea is a potential proliferator, but about how swiftly the ROK-U.S. alliance can convert its technological capabilities into strategic cooperation. The global nuclear energy ecosystem faces mounting risks stemming from its dependence on Russian uranium. Russia accounts for over 40% of global enrichment capacity and remains a critical supplier of low-enriched uranium (LEU), even to Western nuclear power plants.²⁶⁾ Any potential disruption - whether due to geopolitical escalation, sanctions, or

22) Executive Orders, "Reinvigorating the Nuclear Industrial Base," The White House, May 23, 2025, <https://www.whitehouse.gov/presidential-actions/2025/05/reinvigorating-the-nuclear-industrial-base/>.

23) Mike Wendling, "Why Big Tech's Nuclear Plans Could Blow Up," BBC, October 15, 2025, <https://www.bbc.com/worklife/article/20251008-why-big-tech-is-going-nuclear>.

24) Ibid.

25) Amazon, "Amazon Signs Agreements for Innovative Nuclear Energy Projects to Address Growing Energy Demands," October 16, 2024, <https://www.aboutamazon.com/news/sustainability/amazon-nuclear-small-modular-reactor-net-carbon-zero>.

26) Felicity Bradstock, "Why the World Can't Easily Wean Itself Off Russian Nuclear Fuel," *Oilprice*, September 28, 2025, <https://oilprice.com/Energy-General/Why-the-World-Cant-Easil-y-Wean-Itself-Off-Russian-Nuclear-Fuel.html>.

retaliatory export controls – could severely impact existing reactor operations and delay the deployment of next-generation reactors. At the same time, China has become the world's fastest expanding nuclear power producer, accelerating its construction of both conventional and advanced reactors and reshaping the geopolitical landscape of civilian nuclear energy.

Against this backdrop, rather than viewing South Korea's nuclear expertise as a source of potential shirking, it should be treated as a strategic asset that can deepen mutual trust within the broader ROK-U.S.-Japan alignment vis-à-vis North Korea-China-Russia bloc. In a context defined by rising demand, strategic necessity, and the deterrent value of latent capabilities, the most urgently priority is to elevate the level of trust and institutionalized consultation mechanisms among allies. This shift would transform nuclear cooperation from a source of suspicion into a cornerstone of alliance resilience.

6. Policy Recommendations: Modernizing the ROK-U.S. Alliance

As extended deterrence in Northeast Asia comes under renewed stress, the United States must recalibrate its strategic posture to maintain assurance commitment, deter adversaries, and prevent further nuclear proliferation. Given the shifting threat perceptions in South Korea and the declining credibility of nuclear assurance, rhetorical commitments alone are no longer sufficient. This section outlines four strategic courses of action Washington should pursue.

First, while reaffirming to nonproliferation norms, Washington should reconsider the technological constraints imposed on South Korea's nuclear fuel cycle. Doing so would allow the alliance to more effectively leverage the deterrent value of nuclear latency. This particularly relevant in the context of Northeast Asia, where the evolving strategic alignment between North Korea, China, and Russia increasingly challenges the sufficiency of U.S. deterrence alone. Tangible modernization of the alliance is needed – not only to demonstrate cohesion but also to strengthen psychological assurance among the alliance and the external observers.

Given South Korea's potential to advance nuclear fuel cycle and the rapidly shifting strategic environment, the ROK-U.S. alliance should consider revisiting the current restrictions on reprocessing under the 123 Agreement to ensure that they reflect contemporary technological demand and the intensifying global energy competition. The management of spent nuclear fuel has become a global challenge. As China accelerates its nuclear power capacity, the United States should actively leverage the technological expertise of its allies. As a leading innovator in next-generation reactors, South Korea is well positioned to develop safe and effective fuel management system tailored to the specific characteristics of emerging reactor designs. Such a review would serve as a more stable alternative to discussions that carry higher strategic risks - such as the redeployment of U.S. tactical nuclear weapons in Northeast Asia or formal nuclear-sharing arrangements with South Korea and Japan modeled on NATO. Through enhanced trilateral coordination, Japan could play a constructive role in supporting South Korea's transition toward a more stable and transparent fuel cycle framework, one that mirrors Japan's approach while reinforcing alliance cohesion.

Second, Washington should continue to promote the NPT framework as a means of reaffirming its global leadership and should actively engage both Seoul and Tokyo in upholding nonproliferation norms. Drawing from the four pillars of effective hedging, institutionalized enforcement mechanisms can help manage the protégé's hedging behavior without undermining alliance trust. Experts estimate that South Korea would need to withstand at least one year of international sanctions to complete nuclear weapons development. Given the already sensitive atmosphere exacerbated by recent tariff negotiation with the United States, and historical experience with latent nuclear ambitions, any form of hedging behavior that risks undermining alliance cohesion remains politically and economically implausible.

Third, ROK-U.S. alliance should continue to invest in next-generation technologies, especially pyroprocessing, while recognizing that a short-term, actionable roadmap for resolving spent fuel storage issue is equally urgent. If full-scale reprocessing remains politically infeasible in the near term, a phased or conditional arrangement - such as granting limited contracts to France or the United Kingdom for MOX fuel

purchases or outsourced reprocessing - could serve as an interim solution.²⁷⁾ Although the High-level Bilateral Commission was formally established to address such issues, it has recently shown limited activity in terms of public meetings or tangible outcomes. The ROK-U.S. alliance should therefore prioritize the implementation of immediately actionable confidence-building measures to create a more enabling environment for joint research and expert exchange.

Last but not least, Washington must maintain diplomatic pressure on North Korea's nuclear program while remaining open to calibrated engagement. Pyongyang is now reportedly considering discretionary nuclear use on the Korean Peninsula and is likely to further rely on nuclear weapons as a substitute for conventional readiness, which has been deployed to Ukraine war for unknown material benefits. As previously noted, the effectiveness of hedging as a bargaining strategy within an alliance depends not only on technological capacity but more crucially on strategic vulnerability. Consistent efforts by the United States to address its allies' most compelling threats will help reinforce Washington's credibility and long-term commitment to regional stability - thereby reducing the likelihood that South Korea would seriously contemplate nuclear proliferation.

At this point it is important to note that the term latency remains politically and academically sensitive in South Korea. Within academic circles, this concept is often avoided due to its perceived association with potential nuclear proliferation or alliance erosion. In the civil nuclear industry, the term latency is viewed as something that hinders reactor exports and invites unnecessary scrutiny. This hesitation reflects a broader perception that has long existed in alliance dynamics: that nuclear latency inherently signals hedging behavior against one's own ally. This paper challenges that assumption. It argues instead that when governed by institutional safeguards and grounded in technological rationale, latency can serve as a source of alliance

27) Nuclear Fuel Committee, Korean Nuclear Society, "Policy Recommendations on Current Issues and Solutions for Nuclear Fuel Cycle Technology," Korea Atomic Energy Research Institute (KAERI) 73, 2025-02 (2025), <https://www.kaeri.re.kr/board/view?pageNum=1&rowCnt=10&no1=72&linkId=12480&menuId=MENU00928&schType=0&schText=&boardStyle=&categoryId=&continent=&country=&schYear=>.

resilience. In this regard, future research should explore alternative terminology and framing that can bridge this conceptual gap. Only by reconfiguring this discourse around latency can both sides move toward a more adaptive and trust-based nuclear partnership.

7. Conclusion

The ROK-U.S. alliance today operates in a complex strategic environment shaped by shifting threat perceptions, enduring questions of assurance, and the growing salience of nuclear latency. While extended deterrence continues to anchor U.S. security commitments in Northeast Asia, its credibility is increasingly tested by North Korea's advancing capabilities, China's assertive posture, and Russia's nuclear signaling and insecurity of secured uranium supply. In this context, South Korea's position as a nuclear threshold state - equipped with advanced civilian nuclear infrastructure yet constrained by strong institutional mechanisms - highlights both the risks and opportunities embedded in latent deterrence.

Table 1. Hedging as Effective Bargaining Strategy in the ROK-U.S. Alliance Context

Conditions for Effective Hedging	ROK-U.S. Alliance Context (Hedging Likely/Unlikely)
Credible signal of willingness and conditional restraint	Unlikely: historical legacy; no political signal; firmly committed to the NPT
Domestic legitimacy of hedging strategy	Likely: Public anxiety over U.S. reliability enables framing of hedging as rational
Driven by strategic vulnerability over technological capacity	Likely: surrounded by nuclear adversaries; hedging rooted in insecurity, not opportunism
Enforcement costs	Unlikely: strong institutional mechanisms; reliance on the U.S. nuclear umbrella

Deterrence, as fundamentally a psychological and political calculation, necessitates a modernization of how deterrence is conceptualized and operationalized. As summarized in Table 1, South Korea meets two likely conditions that enable hedging behavior - domestic legitimacy and heightened vulnerability. However, the alliance's historical legacy, lack of political intent to proliferate, and robust institutional

mechanisms reduce the likelihood that such behavior would translate into serious strategic rupture. Instead, these dynamics offer an opportunity to strategically leverage South Korea's latent capabilities as part of a modernized deterrence architecture.

Beyond the security domain, the ROK-U.S. alliance now faces two overriding goals in an era increasingly shaped by AI-driven energy competition. Rather than viewing technological advancement through a narrow proliferation lens, the United States should engage its allies in forward-leaning nuclear partnerships that align energy, deterrence, and nonproliferation goals. This includes reevaluating the constraints of the 123 Agreement, expanding cooperation in pyroprocessing, and building trilateral consensus with Japan on a more flexible and transparent fuel cycle regime.

The durability of extended deterrence in the 21st century will depend not only on military posture but on Washington's ability to recognize and integrate the latent strategic value of its allies. By modernizing the conceptual foundations of deterrence and transforming nuclear latency from a source of suspicion into a pillar of strategic resilience, the ROK-U.S. alliance can reinforce both regional stability and uphold global nonproliferation norms - without forcing trusted allies to cross the nuclear threshold.

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V. Atoms for Peace or Strategic Power? Re-aligning U.S.–South Korea’s Nuclear Nonproliferation Agendas

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1. Introduction

Since the aftermath of World War II, the United States and the Republic of Korea (ROK, also known commonly as South Korea) have shared strategic diplomatic, security, and economic relations. The U.S.-ROK security alliance—forged during the 1950s Korean War and codified in the 1953 U.S.-ROK Mutual Defense Treaty—stands as a powerful, strategic “linchpin”¹⁾ for U.S. foreign policy and extended deterrence in the Indo-Pacific region. Over the past 70 years, the relationship between Washington and Seoul has extended beyond bilateral security dynamics, encompassing critical cooperation and, at times, competition in the global supply chain for core traditional and emerging technologies. Within today’s evolving security dynamics in the Indo-Pacific region, the U.S.-ROK “global comprehensive strategic alliance”²⁾ spans geostrategic and economic interests, including shared advancements in civil nuclear technology development, deployment, and export deals.³⁾

Despite the United States and South Korea’s close cooperation, however, growing

1) Often in U.S. foreign policy and military documents, U.S.-ROK relations are herald as the “linchpin” (or also “lynchpin”), indicating South Korea’s pivotal role in promoting peace, security, and prosperity in the Indo-Pacific region. See, “United States-Republic of Korea Leaders’ Joint Statement,” U.S. White House, last modified May 21, 2022, <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2022/05/21/united-states-republic-of-korea-leaders-joint-statement/>.

2) “Leaders’ Joint Statement in Commemoration of the 70th Anniversary of the Alliance between the United States of America and the Republic of Korea,” U.S. White House, last modified April 26, 2023, <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2023/04/26/leaders-joint-statement-in-commemoration-of-the-70th-anniversary-of-the-alliance-between-the-united-states-of-america-and-the-republic-of-korea/>.

3) Orta, Kayla, “US-ROK Global Strategic Partnership in the Indo-Pacific,” Woodrow Wilson International Center for Scholars, March 19, 2024, <https://www.wilsoncenter.org/publication/us-rok-global-strategic-partnership-indo-pacific>.

concerns over North Korea's ever-growing nuclear weapons buildup, the Russia-North Korean defense pact, and a more assertive China have led to a rising tide of voices in South Korea supportive of nuclear armament. Advocates for South Korea's own nuclear sovereignty argue for either the redeployment of U.S. tactical weapons to the Korean Peninsula or, in response to North Korea's disinterest in denuclearization, the development of a South Korean indigenous nuclear weapons program. Amid these shifting dynamics, recent announcements by U.S. President Donald Trump and South Korean President Lee Jae Myung have also set steps in motion to readdress longstanding limitations on South Korea's enrichment and reprocessing technologies. On November 13, 2025, the two nations agreed to support the exploration of South Korea expanded fuel cycle capabilities to include "the ROK's civil uranium enrichment and spent fuel reprocessing for peaceful uses" under the current bilateral legal framework and regulatory systems in each country respectively.⁴⁾

While South Korea's internal debate over 'going nuclear' is based in rising regional security concerns, the ongoing U.S.-ROK discussions over revising previously agreed upon limits for uranium enrichment and spent fuel reprocessing are rooted in broader considerations for long-term energy security and, most importantly, nuclear nonproliferation. Conflating the two agendas may present costly diplomatic and economic implications for South Korea's emerging and globally expansive civil nuclear export industry. As Washington and Seoul seek to secure global leadership in civil nuclear energy,⁵⁾ such pro-nuclearization debates within South Korea risk destabilizing early advancements in the two nations' collaborations on advanced nuclear research and development (R&D) and third-party civil nuclear export initiatives.

4) U.S. White House, "Joint Fact Sheet on President Donald J. Trump's Meeting with President Lee Jae Myung," November 13, 2025, <https://www.whitehouse.gov/fact-sheets/2025/11/joint-fact-sheet-on-president-donald-j-trumps-meeting-with-president-lee-jae-myung/>.

5) Orta, Kayla, "US-South Korean Civil Nuclear Exports Are a Winning Strategy," *The National Interest*, September 29, 2025, <https://nationalinterest.org/blog/energy-world/us-south-korean-civil-nuclear-exports-are-a-winning-strategy>; Also, see, Jeon, Kyung-joo and Kayla Orta, "Strength in Partnership: Elevating U.S.-ROK Cooperation in Nuclear Energy," *The National Interest*, April 15, 2025, <https://nationalinterest.org/blog/energy-world/strength-in-partnership-elevating-u-s-rok-cooperation-in-nuclear-energy>.

2. South Korea's Civil Nuclear Leadership

Within the global nuclear energy market, South Korea is increasingly recognized as a nuclear energy powerhouse—having successfully transitioned from a domestically-focused civil nuclear industry to a globally-oriented export nation. In 2024, South Korea was ranked the fifth largest nuclear energy producer, surpassed only by the United States, China, France, and Russia.⁶⁾ Leading South Korea's civil nuclear developments are the nation's state-owned and corporate-led industry and research institutions, including the Korea Atomic Energy Research Institute (KAERI), Korea Hydro & Nuclear Power (KHNP), Korea Electric Power Corporation (KEPCO), Doosan Enerbility, and Hyundai E&C among others. Furthermore, these frontrunner institutions and companies have placed South Korea's civil nuclear industry at a strategic advantage internationally, successfully securing competitive nuclear export deals first in the United Arab Emirates (UAE) and, more recently, the Czech Republic. With expectations for global nuclear energy demand predicted to rise,⁷⁾ South Korea's civil nuclear industry is likely to push forward future international nuclear reactor exports both in traditional and new market regions, including Europe, the Middle East, and Southeast Asia.⁸⁾

1) Development of South Korea's Civil Nuclear Program

Historically, South Korea ventured first into atomic energy R&D in the aftermath of the Korean War (1950-1953). Seeking to rebuild the nation, South Korea actively explored various energy pathways as a means to fuel post-war reconstruction. Under the auspice of U.S. President Eisenhower's "Atoms for Peace" initiative, the United States and South Korea signed their first bilateral nuclear cooperation agreement,

6) World Nuclear Association (WNA), "Nuclear Generation by Country," updated September 30, 2025, <https://world-nuclear.org/information-library/facts-and-figures/nuclear-generation-by-country>.

7) See International Atomic Energy Agency (IAEA), *Energy, Electricity and Nuclear Power Estimates for the Period up to 2050* (IAEA, 2025). <https://doi.org/10.61092/iaea.gwov-o544>.

8) See, Lee, Heesu and Will Wade, "As Nuclear Power Makes a Comeback, South Korea Emerges a Winner," *Bloomberg*, May 14, 2025, <https://www.bloomberg.com/news/features/2025-05-14/south-korea-nuclear-energy-is-leading-the-industry-comeback>.

titled the “Agreement on Cooperation Concerning Civil Uses of Atomic Energy,” in 1956. The following year, South Korea joined the International Atomic Energy Agency (IAEA) on 8 August 1957, signaling its commitment to the development of peaceful nuclear energy. At a domestic level, the ROK government established the national oversight framework for atomic energy first through the passing of the nation’s 1958 Atomic Energy Law, which founded the Office of Atomic Energy in 1959.⁹⁾ In 1958, the ROK government selected a U.S. company, General Atomics, to build the nation’s first Korean Research Reactor (KRR), a 100-kilowatt (kW) TRIGA Mark-II reactor. In 1962, with U.S. and IAEA technical assistance, the research reactor, KRR-1, reached criticality—marking South Korea’s official entry into the nuclear age.¹⁰⁾

During the late 1960s, growing energy demands and regional security tensions spurred South Korea to pursue a focused civil nuclear energy program. As such, in 1967, the United States, South Korea, and the IAEA concluded a trilateral safeguards agreement¹¹⁾ which resulted in a second research reactor, KRR-2 (TRIGA Mark III), in South Korea. This agreement marked the first “practical activity” related international safeguards conducted by the ROK government since joining the IAEA.¹²⁾ In 1972, South Korea began construction on the Kori-1 reactor—a U.S.-supplied pressurized water reactor (PWR) built under a Westinghouse turnkey contract—reached operation in 1978. Throughout the 1980s and 1990s, South Korea rapidly expanded its civil nuclear infrastructure, building and connecting fifteen new nuclear reactors to the national grid. Subsequent decades saw the growth of ROK

9) *Atomic Energy Act*, Republic of Korea (ROK) National Assembly, Korea Law Translation Center, accessed August 14, 2025, https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=23918&type=soga n&key=2.

10) Lee, Kwang Seok, et al., *Investigation on the 50 Years of Nuclear Development in Korea*, Korea Atomic Energy Research Institute, Daejeon (Korea, Republic of), October 2007, <https://inis.iaea.org/records/2raqj-qpa07>.

11) *Agreement Between the International Atomic Energy Agency, the Government of the Republic of Korea and the Government of the United States of America for the Application of Safeguards* (INFCIRC/11), International Atomic Energy Agency (IAEA), April 9, 1968, archived at <https://www.iaea.org/sites/default/files/infirc111.pdf>.

12) Choi, Young-Myung and Hosik Yoo, “Safeguards Development and Challenges in the ROK During the Last Fifty Years,” in *Special Issue: 50 Years of IAEA, Journal of Nuclear Materials Management* 35, no. 4, https://resources.inmm.org/system/files/jnmm/vol_35/V-35_4.pdf.

industry leaders, which emerging as a regional atomic energy powerhouse and drove South Korea's nuclear innovation and forged the Indo-Pacific nation's eventual pathway into the global reactor exports market.

Behind public-facing civil nuclear development, however, the nation's early nuclear energy program raised doubts over South Korea's nonproliferation commitments. In the 1970s, the persistent security tensions with North Korea and the withdrawal of 20,000 U.S. troops stationed on the Korean Peninsula led the Park Chung-hee administration to explore alternative strategies for ensuring South Korean national security, including seeking out pathways to establish an early-stage nuclear weapons and missile programs. The Park administration's efforts to purchase dual-use nuclear technology and materials from Canada, France, and, later, Belgium seeded concerns in Washington over Seoul's pursuit of a nuclear weapons program.¹³⁾ To halt the South Korea's acquisition of military-use nuclear technology, the U.S. government conditioned its continued technical and industrial nuclear cooperation with Seoul on the renewed assurances of its commitments for peaceful nuclear development.

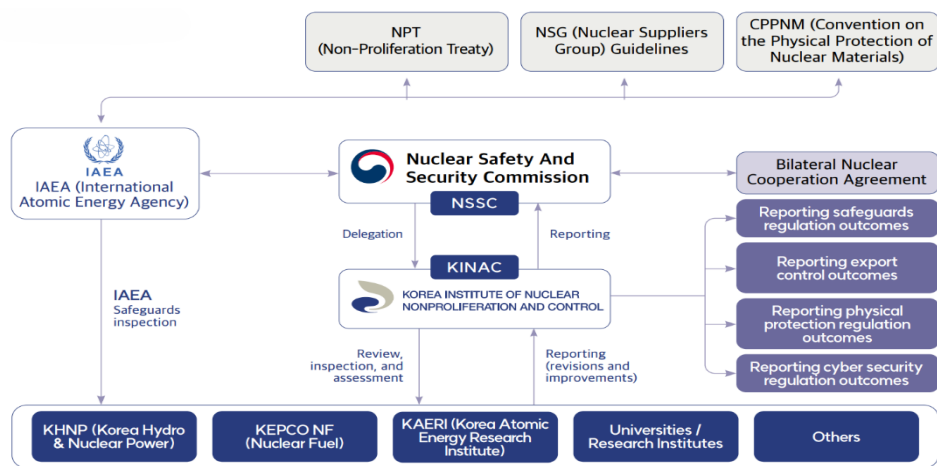
As such, the United States required that South Korea reaffirm its nonproliferation obligations through a new "123 Agreement" as defined in the 1954 U.S. Atomic Energy Act and signatory accession to the Nuclear Non-Proliferation Treaty (NPT). South Korea fulfilled these commitments by concluding the revised U.S.-ROK bilateral cooperation agreement in 1974—later renewed in 2015—and formally joined the NPT in 1975. Since signing the NPT, South Korea also ratified the Convention on the Physical Protection of Nuclear Materials in April 1982 and Comprehensive Nuclear-Test-Ban Treaty in September 1999.¹⁴⁾ These foundational agreements

13) For a discussion on South Korea's historical nuclear weapons program, see Kim, Seung-Young, "Security, Nationalism and the Pursuit of Nuclear Weapons and Missiles: The South Korean Case, 1970-82," *Diplomacy & Statecraft*, 12, no. 4, 53-80, <http://dx.doi.org/10.1080/09592290108406226>; Hong, Sung Gul, "The Search for Deterrence: Park's Nuclear Option," Chapter in *The Park Chung Hee Era: The Transformation of South Korea*, edited by Byung-Kook Kim and Ezra F. Vogel (Harvard University Press, 2013), 483-510, <https://doi.org/10.4159/harvard.9780674061064.c17>; Lim, Eunjung, "South Korea's Nuclear Dilemmas," *Journal for Peace and Nuclear Disarmament*, 2, no. 1, 297-318, <https://www.tandfonline.com/action/showCitFormat?doi=10.1080/25751654.2019.1585585>.

14) For an overview of South Korea's nonproliferation and disarmament agreements, see United

continue to underpin South Korea's present-day adherence to the peaceful, secure, and transparent development of nuclear energy.

As a signatory of the NPT, South Korea holds nonproliferation agreements bilaterally with the United States and the IAEA respectively. Beyond its initial IAEA safeguards agreement, South Korea became the 39th country to sign the IAEA's Addition Protocols in June 1999. After ratification in February 2004, the formal agreement, titled "Protocol Additional to the Agreement between the Government of the Republic of Korea and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons," grants the IAEA additional access to information and facility locations for the entirety of South Korea's domestic nuclear program, ongoing R&D, and nuclear material balances and trade relations.¹⁵⁾



South Korea's regulatory and research institutions in support of nuclear safety, security, and safeguards¹⁶⁾

Nations (UN), "Republic of Korea," Office for Disarmament Affairs' Regional Centre for Peace and Disarmament in Asia and the Pacific, accessed on November 13, 2025, <https://www.unrcpd.org/region/republic-korea/>.

15) "IAEA Additional Protocol Entered into Force in the Republic of Korea," ROK Ministry of Foreign Affairs, February 18, 2004, https://www.mofa.go.kr/eng/brd/m_5676/view.do?seq=296347&src_hFr=&%3BsrchTo=&%3BsrchWord=&%3BsrchTp=&%3Bmulti_itm_seq=0&am p%3Bitm_seq_1=0&am p%3Bitm_seq_2=0&am p%3Bcompany_cd=&am p%3Bcompany_nm=&pa ge=846&titleNm=.

16) For an overview of South Korea's nuclear-related regulatory organizations and R&D facility, see Korea Institute of Nuclear Nonproliferation and Control (KINAC), "Institutional Brochure

In order to ensure continue compliance to international and bilateral nonproliferation agreements, South Korea has a well-established nuclear regulatory and safeguards framework. In accordance with the NPT, the ROK government devised a state system for accounting and control (SSAC) of nuclear materials as required for its national reporting to the IAEA beginning in the 1970s. Through the ROK's Atomic Energy Law, the Ministry of Science and Technology established, under KAERI, the Technology Center for Nuclear Control (TCNC), a "formal technical body for national safeguards implementation," in 1994.¹⁷⁾ Later, the TCNC was changed to the Korea Institute of Nuclear Nonproliferation and Control (KINAC) in June 2006 as means to strengthen the independence of the SSAC system.

Today, KINAC plays a pivotal role in ensuring domestic-level partnerships in monitoring, enhancing, and reporting for South Korea's IAEA safeguards commitments. Internationally, KAERI and KINAC lead a variety of research initiatives and workforce development programs, which underpin South Korea's long-term support the IAEA's global nonproliferation efforts and the safe, secure, and responsible expansion of nuclear energy worldwide.

2) Future of South Korea's Civil Nuclear Advancements

According to the IAEA's annual forecasting, the global nuclear energy capacity—which was 337 gigawatts (GWe) in 2024—is expect to increase at 50% to reach 561 GWe by 2050 based on low estimates.¹⁸⁾ Based on high case scenarios, nuclear operational capacity is projected to increase upwards of 2.6 times by the mid-century.¹⁹⁾ As a leading nuclear energy producer globally, South Korea is well positioned to play a key international role in the development and deployment of

[in English],” (Daejon, 2024), pg. 7, accessible online at <https://www.kinac.re.kr/board/view?pageNum=1&rowCnt=8&linkId=LK0000018946&menuId=MN0000000430&schType=0&boardStyle=&categoryId=&continent=&siteId=00003&contents1=&contents2=&country=&schText=&schKeyword=>.

17) Choi and Yoo, “Safeguards Development.”

18) IAEA, *Energy, Electricity and Nuclear Power Estimates*.

19) Ibid.

next-generation advanced nuclear technologies. With 26 operating reactors supplying roughly one-third of national electricity, South Korea ranks among the world's top five nuclear energy producers.²⁰⁾ Domestically, South Korea's civil nuclear infrastructure is set to continue to grow with two new APR-1400 reactors slotted for finished construction by the early 2030s, while international Korean companies have won competitive nuclear reactor exports bids in the Middle East and Eastern Europe.

With newcomer nations worldwide looking to sign cooperative memorandums of understanding (MOUs) and, potentially, purchase nuclear reactors, South Korea stands to benefit from rising demand for advanced nuclear technologies. Next-generation nuclear reactors offer new design features to address traditional issues of legacy reactors; and, increasingly national governments are more interested in exploring potential routes to install advanced, small, and micro modular reactors (AMRs, SMRs, and MMRs respectively). Recently, SMRs, producing a maximum of 300 megawatts (MWe) per unit, are increasingly viewed as a more desirable choice compared to their traditional gigawatt counterparts. In this regard, South Korea's advancements in next-generation civil nuclear technologies—exemplified by KHNP and KAERI's development of the i-SMR and SMART-100 reactor designs—demonstrate the country's capacity to provide scalable solutions that expand energy production domestically and, simultaneously, stimulate opportunities for broader entry into international nuclear energy markets.²¹⁾

South Korea's established technical expertise, robust regulatory framework, and proven track record in reactor design and construction uniquely position the nation to lead the global transition toward advanced and SMR technologies. By capitalizing on its strengths in innovation, manufacturing, and export competitiveness, South Korea can play a pivotal role in shaping the emerging international nuclear

20) World Nuclear Association, "Nuclear Power in South Korea," last updated October 24, 2025, <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-korea>.

21) Orta, Kayla, "High-Tech Alliances: South Korea, the G7 and the Future of AI and Nuclear Innovation," in *IAI Papers Series*, No. 25 (26), Istituto Affari Internazionali, October 30, 2025, <https://www.iai.it/en/pubblicazioni/c03/high-tech-alliances-south-korea-g7-and-future-ai-and-nuclear-innovation>.

landscape while advancing global energy security and championing the U.S.-led nonproliferation regime and implementation of IAEA safeguards.²²⁾ However, renewed domestic debates surrounding potential nuclear weapons development risk undermining this progress. Such discourse could erode international confidence in South Korea's long-standing nonproliferation commitments, jeopardize partnerships built on trust and transparency, and constrain the country's expanding civil nuclear export potential. To sustain global credibility as a responsible nuclear energy leader, therefore, will depend on Seoul's continued emphasis on peaceful nuclear development, technological excellence, and steadfast adherence to nonproliferation norms.

3. Implications of the Indo-Pacific's Evolving Nuclear Landscape

With the rise of geopolitical competition and increasing erosion of legacy arms control agreements, the post-Cold War system of nuclear restraint is being challenged at a global scale. According to the U.S. 2022 National Security Strategy, over the next five to ten years, the United States will for “first time” face the dual-front challenge of deterring two competing nuclear powers: Russia and China.²³⁾ Since the end of the Cold War, the U.S.-led nuclear proliferation regime—mainly rooted in the NPT's international framework, enforced by international consensus, and monitored by the civil nuclear energy watch-dog, the IAEA—has stood as a bulwark against the technological diffusion and horizontal spread of nuclear weapons. However, amid today's rising challenges, the threat landscape is both increasingly “dynamic and uncertain”²⁴⁾ and, ever more, intertwined across key national industries for critical and emerging technologies.

22) Jeon and Orta, “Strength in Partnership.”

23) *National Security Strategy*, U.S. White House, October 2022, <https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>.

24) “Under Secretary Jenkins’ Remarks at the NATO WMD Conference,” U.S. Department of State, last updated on 3 October 2024, <https://2021-2025.state.gov/under-secretary-jenkins-remarks-at-the-nato-wmd-conference/>.

Today, the United States, alongside regional allies and partners, is questioning the dawn of a ‘third’ nuclear age, faced for the first time with the potential of a recognized multipolar nuclear security landscape.²⁵⁾ Within Northeast Asia, Russia, China, and North Korea all present strategic challenges to U.S. national security interests. Russia’s near-peer and China’s pacing nuclear threat present challenges to the post-Cold War balance of international power and previously established systems of arms control. Despite a robust history of U.S.-USSR (later Russian) arms control and cooperative threat reduction (CTR) initiatives, Russia has increasingly played an obstructionist role in ongoing U.S.-Russian risk reduction talks. Furthermore, Russia’s denouncement of its treaty obligations under the Measures for the Further Reductions and Limitation of Strategic Offensive Arms (New START)—set to expire in early 2026—many traditional supporters of global arms control frameworks are increasingly worried about potentially systemic corrosion of effective nonproliferation and arms control engagement. Additionally, China is quickly rising in its nuclear ambitions. According to the Stockholm International Peace Research Institute (SIPRI), China’s nuclear industrial complex is undergoing “significant modernization and expansion of its nuclear arsenal,” with the potential of amassing a stockpile of 1,500 nuclear warheads by 2035.²⁶⁾

Moreover, North Korea’s advancement of its nuclear weapons buildup continues to included enhancements in warhead technologies and missile testing. Previously estimates showed that Pyongyang’s nuclear weapons program could entail upwards of 200 nuclear warheads by 2027.²⁷⁾ The continuation of North Korea’s expanding

25) To review the U.S. policy options amid shifting global dynamics and the rise of a multipolar nuclear order, the 2022 National Defense Authorization Act (NDAA) established the U.S. Congressional Commission on the Strategic Posture of the United States; see final report: “America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States,” U.S. Congressional Commission on Strategic Posture of the United States, October 2023, <https://www.ida.org/research-and-publications/publications/all/a/am/america-as-strategic-posture>. For a broader discussion on the ‘third nuclear age,’ see Futter, Andrew, et. al., *The Global Third Nuclear Age: Clashing Visions for a New Era in International Politics* (Routledge, 2025).

26) Stockholm International Peace Research Institute (SIPRI), *SIPRI Yearbook 2025: Armaments, Disarmament and International Security* (Oxford University Press, 2025).

27) See, Bennet, Bruce, et al., *Countering the Risks of North Korean Nuclear Weapons*, (RAND

weapons of mass destruction (WMD) program, including nuclear warhead stockpiling and missile testing, calls into question the feasibility of denuclearization on the Korean Peninsula. Since the 2022 Nuclear Law, North Korea has announced what is essentially a ‘no limit’ buildup policy for its nuclear weapons program.²⁸⁾ Whether for diplomatic leverage or tactical deployment, North Korea’s nuclear weapon program continues to demonstrate an urgent and serious threat to the United States and U.S. allies’ interest in the Indo-Pacific region. For South Korea, most importantly, Pyongyang’s growing WMD program represents an existential threat.²⁹⁾ As such, while Washington is carefully monitoring Moscow and Beijing, Seoul, however, is most concerned with Pyongyang.

4. South Korea’s Security Imperatives & ‘Nuclearization’ Debate

With prospects for diplomatically achieving North Korean denuclearization seeming unlikely, South Korea’s national security is facing perceptible disadvantage against a nuclear-armed North Korea. After the return of U.S. President Donald Trump to the White House, U.S. extended nuclear deterrence commitments towards South Korea are also being called into question. In January 2025, additionally, U.S. Secretary of Defense, Pete Hegseth’s reference to North Korea as a “nuclear power” during his confirmation hearing stoked fear in Seoul that the U.S. administration may no longer pursue denuclearization agreements in exchange for the reduction of economic sanctions but, rather, a measure of arms control on the Korean Peninsula.³⁰⁾ Faced with North Korea’s rising WMD threat, South Korea political leaders and citizens alike are calling for a re-evaluation of what a ‘nuclearized’ South

Corporation, April 2021), https://www.rand.org/content/dam/rand/pubs/perspectives/PEA100/0/PEA1015-1/RAND_PEA1015-1.pdf.

28) Smith, Josh, “New North Korea Law Outlines Nuclear Arms Use, Including Preemptive Strikes,” Reuters, September 9, 2022, <https://www.reuters.com/world/asia-pacific/nkorea-passes-law-declaring-itself-nuclear-weapons-state-kcna-2022-09-08/>.

29) See, Bennet, et al., *Countering the Risks of North Korean Nuclear Weapons*.

30) Panda, Ankit, “South Korea Doesn’t Want North Korea Labeled as a Nuclear Power. It’s Causing Friction With the United States,” in Emissary, Carnegie Endowment for International Peace, January 23, 2025, <https://carnegieendowment.org/emissary/2025/01/north-korea-nuclear-weapons-npt-us-denuclearization-policy?lang=en>.

Korea might look like.

Rising debates in South Korea over indigenous nuclear weapons program are indicative of these shifting dynamics.³¹⁾ Public opinion polls, in recent years, have consistently showed that a majority of South Koreans—ranging from more than 60% to upwards of 80%—are in support of strengthening South Korea’s nuclear deterrence towards North Korea, indicating support for either the return of U.S. tactical weapons or the initiation of an indigenous nuclear weapons program. A survey by the Chey Institute for Advanced Studies conducted in late 2023 to 2024 reported that 72.8% of polled adults supported South Korea developing its own nuclear weapons.³²⁾ Another public opinion poll, conducted by the Korean Institute for National Unification (KINU) from April to May 2024, similarly found that 66% of South Koreans surveyed believed that if “the North does not give up its nuclear arsenal,” then South Korea should also pursue its own nuclear weapons program.³³⁾ In January 2025, following Hegseth’s remarks, a Korean Broadcasting System (KBS) public opinion poll results showed that 74% of South Koreans stated that South Korea should go nuclear if the DPRK is recognized as a formal nuclear weapon stage by the United States.³⁴⁾ In contrast, however, opinion polls of subject matter experts have been more hesitant to promote South Korea’s indigenous nuclearization often citing the potential security and economic risks such actions would entail. A surveyed of over 1,000 selected “strategic elites” in South Korea conducted by the U.S.-based Center for Strategic and International Studies (CSIS) showed results that only 34% of policy elites were in favor of South Korean nuclearization.³⁵⁾

31) See Lim, “South Korea’s Nuclear Dilemmas.”

32) “72.8% of Koreans Support S. Korea’s Nuclear Weapon Development,” *Dong-A Ilbo*, February 6, 2024, <https://www.donga.com/en/article/all/20240206/4731163/1>.

33) Kim, Seung-yeon, “66 pct of S. Koreans Support Developing Own Nuclear Weapons: Poll,” *Yonhap News Agency*, June 27, 2024, <https://en.yna.co.kr/view/AEN20240627011200315>.

34) “KBS Lunar New Year Opinion Poll [KBS 설특집 여론조사],” *KBS News*, January 28, 2025, <https://news.kbs.co.kr/news/pc/view/view.do?ncd=8162418>.

35) Cha, Victor, “Breaking Bad: South Korea’s Nuclear Option,” Center for Strategic and International Studies (CSIS), April 29, 2024, <https://www.csis.org/analysis/breaking-bad-south-koreas-nuclear-option>.

Looking forward, the debate over South Korea's nuclear security context—often a pivotal partisan discussion topic—is unlikely to cease among South Korean expert policy-makers or general public circles alike. The diverging agendas between South Korea's nuclear deterrence concerns—driven mainly by North Korea's expanding WMD program—and the nation's export-focused civil nuclear strategy runs the risk of undermining the U.S.-ROK alliance cohesion and Seoul's international reputation as a trusted exporter of peaceful nuclear energy.

5. Cost of Ambiguity: Risks to Nonproliferation & Market Credibility

Historically, South Korea has already experience international doubts surrounding its civil nuclear program. In 2004, the IAEA found a discrepancy in the declared civilian nuclear activities reported under the ROK government's Member State declarations. According to the IAEA Director General's to the Board of Governors, South Korea conducted from the 1980s to the early 2000s a series of experiments involving uranium conversion and enrichment as well as plutonium separation, which the ROK government “failed to report to the Agency in accordance with its [safeguards] obligations.”³⁶⁾ The discovery of the discrepancy, although representing a small amounts of fissile material, and the nature of South Korea's reporting failures sparked international debates on the credibility of South Korea's safeguards commitments.

At the time, then-president of KAERI, Chang In-Soon argued that the accusations were “absurd” and the incident was relatively minuscule.³⁷⁾ However, during his formal address at the United Nations General Assembly (UNGA) in September 2004, ROK Foreign Minister Ban Ki Moon addressed the crisis full-on, stating that:

36) *Implementation of the NPT Safeguards Agreement in the Republic of Korea* (GOV/2004/84), International Atomic Energy Agency (IAEA), November 11, 2004, <https://www.iaea.org/sites/default/files/documents/gov2004-84.pdf>.

37) Brook, James, “South Korea Calls Experiment Far Below Bomb-Grade Level,” *The New York Times*, September 5, 2004, <https://www.nytimes.com/2004/09/05/world/south-korea-calls-experiment-far-below-bombgrade-level.html>.

“The experiments were isolated, laboratory-scale research activities that a few scientists conducted on their own for purely experimental purposes... In good faith and with full transparency, my government has been providing full cooperation to the IAEA in its activities to review and verify our declarations on nuclear research activities.”³⁸⁾

The address echoed the ROK Standing Committee of the National Security Council’s public announcement on the “Four Principles for the Peaceful Use of Nuclear Energy,” on 18 September 2004.³⁹⁾ By renewing and reaffirming its commitment to nuclear nonproliferation and the peaceful use of nuclear energy, the ROK government stressed the nation’s lack of intent to “develop or possess nuclear weapons” and emphasized Seoul’s pledge to ensure nuclear transparency and adherence to international agreements on nuclear nonproliferation.

While the IAEA ultimately deemed the matter “resolved” in 2007,⁴⁰⁾ South Korea still faced international criticism and intensified scrutiny from its regional and global partners at the time. As a response, the ROK government launched a concentrated diplomatic campaign to re-establish South Korea as a responsible nuclear energy producing nation. In the early 2000s, South Korea’s nuclear industry was in the early phase of establishing the groundwork for future civil nuclear exports. Though the successful nuclear export deal with the United Arab Emirates (UAE) to build four APR-1400 reactors at the Barakah Nuclear Power Plant would not come until 2008, such additional international scrutiny could have weakened international interest in collaboration with South Korean civil nuclear industry.

38) “Keynote Speech by H.E. Ban Ki-moon at 59th United Nations GA,” ROK Permanent Mission to the United Nations, September 24, 2004, https://overseas.mofa.go.kr/un-en/brd/m_5032/view.do?seq=747500&srchFr=&srchTo=&srchWord=&srchTp=&multi_itm_seq=0&itm_seq_1=0&itm_seq_2=0&company_cd=&company_nm=.

39) “Statement by the Standing Committee of the National Security Council - Four Principles on the Peaceful Use of Nuclear Energy,” ROK Ministry of Unification, September 18, 2004, https://www.unikorea.go.kr/eng_unikorea/news/releases/?boardId=bbs_000000000000034&mode=view&cntId=31459&category=&pageIndex=.

40) For concluding review of South Korea undeclared nuclear activities, see *Safeguards Statement for 2007*, International Agency for Atomic Energy (IAEA), May 2007, <https://www.iaea.org/sites/default/files/es2007.pdf>.

More recently, South Korea's pro-nuclear armament debates have triggered debates in Washington regarding South Korea's broader interests in civil nuclear energy production and the inherent dual-use nature such technologies. In March 2025, the U.S. Department of Energy (DOE) designated South Korea as a "sensitive" country, counting the nation on the list of Sensitive and Other Designated Countries.⁴¹⁾ While the list was intended for internal use only—informing DOE offices on regulations for U.S.-South Korean laboratory-to-laboratory activities—the announcement drove concerns in both U.S. and South Korean foreign policy circles on the wider implication of South Korea's designation alongside China, Taiwan, Israel, Russia, Iran, and, even, North Korea.⁴²⁾

To sustain credibility and market competitiveness, South Korea should reinforce its long-standing commitment to the NPT and the IAEA safeguards system, leveraging international diplomatic forums to signal Seoul's responsible nuclear leadership. Overall, strengthening alignment between U.S.-ROK security policy and nonproliferation principles will not only bolster Washington and Seoul's cooperative deterrence capabilities but will also secure Seoul's position as a global leader in IAEA safeguard implementation and advanced civil nuclear innovative.

6. Strengthening South Korea's Civil Nuclear Leadership

Amid the global expansion of civil nuclear technologies, the United States and South Korea have an opportunity to work collectively to reassert shared commitments to nonproliferation and safeguards. In particular, South Korea can demonstrate its civil nuclear leadership through three key avenues: 1) advancing Seoul's nonproliferation leadership in international forums, 2) supporting the IAEA's initiatives for peaceful applications of nuclear technology, and 3) expanding the U.S.-ROK partnerships to nonproliferation-centered advanced nuclear reactor R&D and third-party exports.

41) See, Gardner, Timothy, David Brunnstrom, and Ju-min Park, "US Designated South Korea a 'Sensitive' Country Amid Nuclear Concerns," *Reuters*, March 15, 2025, <https://www.reuters.com/world/us-designated-south-korea-sensitive-country-amid-talk-nuclear-weapons-2025-03-15/>.

42) Ibid.

1) Expanding High-Level Diplomatic Engagement

Over the years, South Korea has played an increasingly visible role in the international community championing the importance of nonproliferation and IAEA safeguards. By hosting the Nuclear Security Summit in 2012, Seoul positioned itself as a global leader on nonproliferation goals, highlighting the ongoing importance of safeguarding nuclear materials and technologies.⁴³⁾ Additionally, the ROK government has co-hosted the annual United Nation Joint Conference on Disarmament and Nonproliferation with the UN Office for Disarmament Affairs (UNODA) since 2001. Through high-level initiatives such as these, Seoul continues to re-enforce the global normative discourse on nuclear governance, and, in turn, this has served to build South Korea's international credibility as a responsible steward of peaceful nuclear technology.

Beyond multilateral summits, South Korea can play a stronger role as a middle-power for mini-lateral cooperation initiatives for nuclear R&D, including through the Generation IV International Forum (GIF). Established based on a seven-nation consortium in 2005, the GIF is a multilateral platform aiming to expand pathways towards first-of-a-kind deployment of advanced nuclear energy systems.⁴⁴⁾ Supported through the Organisation for Economic Cooperation and Development's (OECD) Nuclear Energy Agency (NEA), the GIF has served as a "bedrock" of international R&D toward advance reactor concepts focusing on safety, improved performance, and built-in proliferation-resistant features.⁴⁵⁾ In September 2025, South Korea signed the renewed Generation IV International Forum (GIF) Framework Agreement,⁴⁶⁾ joining the leading nations—including the Canada, France, Japan,

43) Goodby, James E. and Markku Heiskanen, "The Seoul Nuclear Security Summit: New Thinking in Northeast Asia?" March 28, 2012, <https://www.brookings.edu/articles/the-seoul-nuclear-security-summit-new-thinking-in-northeast-asia/>.

44) "Multilateral Cooperation," U.S. Department of Energy, n.d. <https://www.energy.gov/ne/multilateral-cooperation>.

45) "New GIF Framework Agreement to Ensure International Co-operation on Generation IV Systems," Nuclear Energy Agency (NEA), January 29, 2025, https://www.oecd-neo.org/jcms/pl_99831/new-gif-framework-agreement-to-ensure-international-co-operation-on-generation-iv-systems.

Switzerland, the United Kingdom, and the United States—at the forefront of advanced reactor development and deployment.⁴⁷⁾

Overall, South Korea’s sustained engagement—at both the multinational and mini-lateral levels—serves to advance global nonproliferation norms, strengthen IAEA safeguards, and underscores Seoul’s role as a normative leader in the international nuclear nonproliferation order.

2) Supporting the IAEA’s Mission for Peaceful Applications

By supporting both the IAEA’s technical cooperation and safeguard verification agendas, South Korea bolsters the IAEA’s global mission to ensure the safe, secure, and peaceful use of nuclear technologies. To this end, South Korea should continue pivotal legacy projects and supported new initiatives under the IAEA’s variety of mission programs. In particular, South Korea should continue to play a key role in the IAEA’s designated International Centre based on Research Reactors (ICERRs) program and the Network of Analytic Laboratories (NWALs).

First, through the ICERRs, the IAEA supports nuclear newcomer nations to develop laboratory safety and safeguard compliance expertise by offering the usage of laboratory facilities, such as in South Korea, for training and R&D purposes.⁴⁸⁾ In September 2019, IAEA formally recognized South Korea’s world class research facilities by designating KAERI as a participating laboratory for the IAEA-launched ICERRs program.⁴⁹⁾ KAERI’s success in joining the IAEA’s NWALs was due to its

46) Under the renewed the 2025 GIF Framework Agreement, participating nations aim to advance one or more of the following six (6) advanced nuclear reactor technologies: gas-cooled fast reactors, lead-cooled fast reactors, molten salt reactors, sodium-cooled fast reactors, supercritical-water-cooled reactors, and very high-temperature reactors.

47) “Korea Signs the New GIF Framework Agreement,” Generation IV International Forum, September 11, 2025, <https://www.gen-4.org/resources/news-announcements/korea-signs-new-gif-framework-agreement>

48) For more information on ICERRs and a list of participating national laboratories worldwide, see “International Centres based on Research Reactors (ICERRs),” International Atomic Energy Agency (IAEA), <https://www.iaea.org/about/partnerships/international-centres-based-on-research-reactors-icerrr>.

49) Fisher, Matt, “Korea Atomic Energy Research Institute Becomes International Centre under

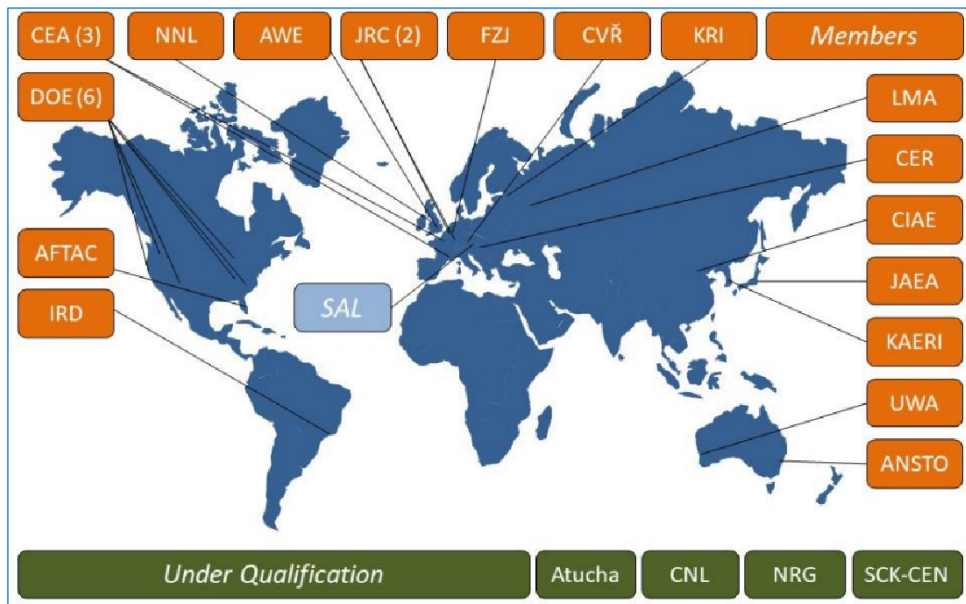
advanced R&D facilities such as the onsite 30 MW(t) research reactor, the High-Flux Advanced Neutron Application Reactor (HANARO), and hot cells facility at the Irradiated Material Examination Facility (IMEF). Through these advanced laboratory facilities, KAERI supports the IAEA's technology cooperation arrangements, providing researchers from participating IAEA Member States access to KAERI's localized training, education, and R&D programs.

Second, KINAC has also assisted in expanding multinational capacity-building programs in nuclear safety and nonproliferation exercise. In 2014, KINAC established the International Nuclear Nonproliferation and Security Academy (INSA) as its flagship nuclear nonproliferation training program. Under INSA, KINAC offers multi-day specialized training in the implementation of IAEA safeguards, including knowledge required for design information questionnaire, nuclear material accounting reports, and additional protocol declarations.⁵⁰⁾ Through INSA program, KINAC has supported the training of nearly 600 nuclear nonproliferation trainees from 28 countries across Africa, Eastern Europe, the Middle East, Africa, and Southeast Asia.⁵¹⁾

IAEA Label," , International Atomic Energy Agency (IAEA), September 17, 2019, <https://www.iaea.org/newscenter/news/korea-atomic-energy-research-institute-becomes-international-centre-under-iaea-label>.

50) See the Korea Institute of Nuclear Non-Proliferation and Control's (KINAC) official website for more information: <https://www.kinac.re.kr/eng>.

51) Jeon and Orta, "Strength in Partnership." Also see, "KINAC Produces 567 International Nuclear Nonproliferation and Nuclear Security Experts" [in Korean], *The Korea Herald*, July 12, 2024, <https://biz.heraldcorp.com/article/3433401>.



IAEA's Network of Analytical Laboratories (NWALs), including 25 qualified laboratories from IAEA Member States worldwide⁵²⁾

Third, South Korea also supports the IAEA through its participation in the NWAL system—a constellation of high-tech laboratories across the global.⁵³⁾ The IAEA depends upon NWAL-listed facilities to support verification of Member States' declarations through technical analysis of environmental sampling. Under the Additional Protocols agreement, IAEA inspectors maintain the ability to collect environmental samples. Environmental sampling—the process of gathering in-fields samples for laboratory analysis—is an essential element in the IAEA's verification toolbox.⁵⁴⁾ With the expansion of nuclear technologies worldwide, the rate of

52) See, International Atomic Energy Agency (IAEA), *Development and Implementation Support Programme for Nuclear Verification 2024-2025* (IAEA, 2024), pg. 38-46, <https://www.iaea.org/sites/default/files/24/01/development-and-implementation-support-programme-for-nuclear-verification-2024-2025.pdf>.

53) Ibid.

54) Following the lessons of the 1990s, including the discovery of Iraq's clandestine nuclear weapons program, the IAEA expanded its purview to confirm the "correctness and completeness" of Member States nuclear facilities declarations through the Additional Protocols. For an overview, see Cabanas, Carmen, "How Environmental Sampling Helps Verify the Peaceful Use of Nuclear," International Atomic Energy Agency (IAEA), September 22, 2021, <https://www.iaea.org/newscenter/news/how-environmental-sampling-helps-verify-the-peaceful-use-of-nuclear>.

samples gathered by IAEA inspectors has been steadily rising. Estimates of annual samples collected are between 400–600 based on IAEA statements and academic reviews⁵⁵⁾—placing mounting pressure on the finite capabilities of the IAEA’s Safeguards Analytical Laboratory (SAL) in Seibersdorf, Austria. To address, South Korean laboratories support the augmentation of the IAEA’s overall capacity to produce accurate and timely sample analysis.⁵⁶⁾

Moving forward, South Korea should continue to bolster the IAEA-led international community as a means of demonstrate the nation’s ongoing commitments to nuclear safety, security, and nonproliferation. Through programs such as ICERRs and the NWAL system, South Korea’s certified laboratories at KAERI play a critical role in supporting training and R&D for newcomer nuclear nations as well as anonymously process environmental samples in support of the IAEA’s global safeguards framework. Lastly, South Korea has invested institutional expertise in developing multinational training and R&D programs at KAERI and KINAC respectively to provide further nuclear training on safety, security, and safeguards.

3) Advancing U.S.–ROK Civil Nuclear Partnership

The evolving global nuclear energy landscape for new and advanced nuclear technologies presents critical opportunity for the United States and South Korea to demonstrate shared commitment to nuclear nonproliferation norms. Both nations should continue to explore safeguards-centered approaches to national and bilateral public-private partnership—leveraging both top-down and bottom-up initiatives with civil nuclear industry.

55) M. Schoeppner, et al, “Evaluating Environmental Sampling Data for Safeguards – Principles and Advances,” Proceedings of the INMM/ESARDA Joint Annual Meeting, May 22–26, 2023, accessed online at https://resources.inmm.org/sites/default/files/2023-07/finalpaper_618_0512102210.pdf.

56) In September 2013, the ROK government announced an interest for the nuclear facilities at KAERI, including the Clean Laboratory for Analysis of Safeguards Samples (CLASS), to be designated as a participating facility in the NWALs system. Later, in 2018, following internal review, South Korea officially became the world’s third institution to join the NWALs system in support of the IAEA’s safeguards sampling analysis.

As a top-down mechanism, Washington and Seoul should further implement the IAEA-led “safeguards-by-design” in the advancements of nuclear technologies, including AMRs and SMRs. On January 8, 2025, Washington and Seoul concluded a joint agreement on the “Principles Concerning Nuclear Exports and Cooperation.”⁵⁷⁾ Building upon the two nations’ long-standing civil nuclear partnerships, the MOU aims to establish a framework for cooperation on third-country civil nuclear exports, “maximizing the peaceful use of nuclear energy under the highest international standards of nuclear safety, security, safeguards, and nonproliferation.”⁵⁸⁾ To further these bilateral agreements, it is increasingly important that Washington and Seoul seek to re-start the High-Level Bilateral Commission (HLBC) in alignment with the 2015 U.S.-ROK 123 Agreement. Despite successfully convening the HLBC in 2016 and 2018, the joint commission halted shortly after due to a confluence of international and domestic challenges, including the intellectual property dispute between Westinghouse and Korean companies. Following Westinghouse’s announced settlement,⁵⁹⁾ however, the two nations have an even greater incentive to reactivate the steering power of the HLBC to align U.S.-ROK shared civil nuclear policies.

As a commercial-led bottom-up strategy, the domestic demonstration and commercialization of first-of-a-kind advanced nuclear technologies will be essential for maintaining long-term competitiveness and adherence to international nonproliferation norms. The United States and South Korea are uniquely positioned to influence the trajectory of advanced reactor development, particularly if supported by sustained investment and adaptive regulatory frameworks. Both nations’ civil nuclear industries hold crucial positions globally as nuclear energy producers as exporters.⁶⁰⁾ According the NEA’s SMR Reactor Dashboard, U.S.

57) *Joint Statement of the United States of America and the Republic of Korea on the Expansion of Peaceful Nuclear Energy*, U.S. Department of Energy, January 8, 2025, <https://www.energy.gov/articles/joint-statement-united-states-america-and-republic-korea-expansion-peaceful-nuclear-energy>.

58) Ibid.

59) “Westinghouse Announces Global Settlement Agreement with KEPCO and KHNP,” Westinghouse, January 16, 2015, <https://info.westinghousenuclear.com/news/westinghouse-announces-global-settlement-agreement-with-kepc-and-khnp>.

enterprises represent approximately one-third of the more than ninety SMR designs presently under review globally.⁶¹⁾ Such industry leadership may serve to not only reinforce the necessity of “safeguards-by-design” for advanced and modular reactors, but could also demonstrate the long-term commercial viability of nonproliferation-centered designs.

Additionally, recent national regulatory authorizations in both the United States and South Korea underscores the technological leadership of both nations’ civil nuclear industries—most notably through NuScale’s VOYGR, Kairos Power’s Hermes, and KAERI’s SMART-100 and i-SMR designs.⁶²⁾ In October 2025, South Korea’s SMART 100 (also known as the System-Integrated Modular Advanced Reactor), designed by KAERI, became the first SMR to officially submit to a safeguards technical report to the IAEA. According to KAERI, the recent successes in the SMART 100 reactor development signals “both a demonstration of Korea’s advanced reactor technology and a commitment to transparency and international trust...By integrating safeguards considerations into the design from the beginning, we are setting a precedent that will benefit future SMR developers.”⁶³⁾ Aiming to achieve initial SMR deployment by the 2030s, both Washington and Seoul share a unique opportunity to meet the rising global nuclear energy demand and ensure strong continuation of each nation’s respective industrial leadership in shaping the future nonproliferation architecture

60) See, Orta, “US-South Korean Civil Nuclear Exports.”

61) Nuclear Energy Agency, *The NEA Small Modular Reactor Dashboard: Second Edition* (OECD Publishing, 2024).

62) For an in-depth review of current SMR development initiatives, see International Atomic Energy Agency (IAEA), *Small Modular Reactors: Advances in SMR Developments 2024*, (IAEA, 2024), <https://doi.org/10.61092/iaea.3o4h-svum>; and also, International Atomic Energy Agency (IAEA), *Advances in Small Modular Reactor Technology Developments - A Supplement to: IAEA Advanced Reactors Information System (ARIS)* (IAEA, 2020), https://aris.iaea.org/publications/smr_book_2020.pdf. Additionally, for specific discussion on leading nuclear developers, particularly the Group of Seven (G7), see Orta, Kayla, “High-Tech Alliances: South Korea, the G7 and the Future of AI and Nuclear Innovation,” in *IAI Papers Series*, No. 25 (26), Instituto Affari Internazionali, October 30, 2025, <https://www.iai.it/en/pubblicazioni/c03/high-tech-alliances-south-korea-g7-and-future-ai-and-nuclear-innovation>.

63) “South Korea to Submit Safeguards Report for SMR Design,” *World Nuclear News (WNN)*, October 21, 2025, <https://world-nuclear-news.org/articles/korea-to-submit-safeguards-report-for-smr-design>.

within the international export market for advanced nuclear technologies.

In summary, South Korea's sustained engagement in advancing global nonproliferation norms and strengthening IAEA safeguards continue to re-enforce Seoul position as a normative leader in the international nuclear order. Looking forward, there is a strategic opportunity for the U.S.-ROK bilateral to "serve as a model" for the safeguarding of nonproliferation commitments within the expanding international nuclear export market.⁶⁴⁾

7. Conclusion

Building on its longstanding alignment with U.S. nonproliferation principles, South Korea can reinforce its reputation as a responsible nuclear actor while enhancing U.S.-ROK deterrence cooperation and consolidating its role as a global leader in IAEA safeguards and advanced nuclear innovation. Driven by North Korea's unchecked weapons programs and perceived shifting of U.S. extended deterrence imperatives, South Korea's nuclearization narratives are a significant ongoing domestic debate. Misalignment of Seoul's nuclear agenda, however, would come at the expense of South Korea's hard-earned reputation as a responsible civil nuclear actor within the global nonproliferation regime. To sustain long-term credibility and market competitiveness, Seoul must reaffirm its commitment to the NPT, IAEA safeguards, and international transparency as the core pillars of its civil nuclear agenda.

Historically, by institutionalizing stringent regulatory mechanisms and embracing transparency measures under the IAEA's Additional Protocols framework, Seoul has transformed historic skepticism into international confidence in its peaceful nuclear intentions. As such, South Korea's civil nuclear industry presents a model of innovation and trust that can reinforce global nonproliferation norms. By embedding "safeguards-by-design" principles into next-generation reactor development, supporting the IAEA's verification and training initiatives, and expanding

64) See, Jeon and Orta, "Strength in Partnership."

international cooperation through multilateral and mini-lateral forums, Seoul can continue to demonstrate how technological advancement and nonproliferation can be mutually reinforcing. Additionally, through nonproliferation regulatory and R&D institutions such as KAERI and KINAC, South Korea is already translating its technical expertise into tangible capacity-building programs that strengthen global safeguards implementation and elevate its standing as a responsible exporter of advanced nuclear technologies.

Ultimately, the future of the U.S.-ROK civil nuclear alliance will depend on the ability of both partners to align security policy with nonproliferation principles. As global nuclear competition intensifies, Washington and Seoul have an opportunity to transform their nuclear cooperation from a partnership mainly defined by ambiguity to one anchored in long-term mutual commitment towards strengthening the future of global nuclear nonproliferation and safeguards.

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VI. Saudi Arabia's Nuclear Energy Turn: A Test Case for ROK-U.S. Alliance

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1. Introduction

As the global energy landscape undergoes a profound transformation driven by decarbonization and the shift toward cleaner and more secure energy systems, nuclear power is re-emerging as a strategic pillar in the pursuit of energy security and technological autonomy. For Saudi Arabia, long reliant on fossil fuels, developing a civilian nuclear program is central to its economic diversification strategy, reducing hydrocarbon dependence while supporting industrial growth, fiscal stability, and the broader objectives of Vision 2030.

For South Korea, the Saudi nuclear tender aligns with Seoul's push to consolidate leadership in civil nuclear exports and revive its domestic supply chain. Under former President Yoon Suk Yeol (2022-2025), the government reset energy policy to maintain nuclear power at 30% of electricity generation by 2030, reinforcing export credibility. South Korea has also set a goal to export 10 nuclear power plants by 2030, a target repeatedly affirmed by government and industry statements since 2022.¹⁾ To sustain this push, Seoul has committed funding to next-generation SMR development (about KRW 400 billion over six years),²⁾ alongside broader measures to extend reactor lifetimes and restart paused projects. This export posture builds on KHNP/KEPCO's track record, notably the APR1400 deployment at the UAE's Barakah plant, which South Korea often cites as proof of schedule and cost discipline in overseas projects.

1) *World Nuclear Association*. "Nuclear Power in South Korea." Updated October 24, 2025. <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-korea>.

2) Patrycja Rapacka and David Dalton, "New Energy Policy Reverses Phase-Out Plans and Targets 30 % Nuclear Share in 2030," *NucNet*, July 6, 2022, <https://www.nucnet.org/news/new-energy-policy-reverses-phaseout-plans-and-targets-30-nuclear-share-in-2030-7-3-2022>.

As a result, if South Korea were to secure the Saudi nuclear contract, it would reinforce Seoul's credentials as a reliable global exporter and provide further evidence of the successful deployment of its reactor model. Such a win could also open new opportunities across the Middle East, where several states are exploring nuclear energy as part of their diversification strategies. However, a major obstacle lies in the ongoing U.S.-South Korea dispute over export control rights. The United States has expressed concern over the transfer of South Korean reactors that incorporate U.S.-origin technology, claiming that certain components and design elements, licensed through Westinghouse Electric, are subject to U.S. export authorization under Section 123 Agreements. As a result, Washington maintains that Seoul must obtain prior approval before exporting its reactors to third countries such as Saudi Arabia.

The situation today is far more complex than it was in 2009, when South Korea signed the Barakah contract with the United Arab Emirates. The international environment has changed significantly, marked by heightened political sensitivities surrounding nuclear technology, stricter nonproliferation scrutiny, and growing geopolitical rivalry among major powers. The UAE's agreement was facilitated in part by its decision to sign a U.S. Section 123 Agreement, often referred to as the *gold standard*, which legally prohibits uranium enrichment and reprocessing within its territory. This voluntary commitment to stringent nonproliferation standards helped secure U.S. approval for the technology transfer and eased international concerns.

In contrast, Saudi Arabia has not yet indicated a willingness to adopt similar restrictions. Riyadh maintains that its civilian nuclear program is fully consistent with IAEA safeguards and international law, emphasizing that the Nuclear Non-Proliferation Treaty recognizes its right to pursue a complete peaceful nuclear fuel cycle. From Washington's perspective, however, the absence of a U.S.-Saudi Section 123 Agreement continues to pose unresolved questions about how enrichment and reprocessing activities would be governed in the future. This uncertainty complicates U.S. authorization for the export of reactors or major components by any foreign partner, including South Korea. This does not preclude

cooperation. A broader strategic understanding that addresses Riyadh's security concerns and clarifies long-term political commitments could alter the nonproliferation calculus and create space for deeper nuclear engagement. Such a framework might provide the confidence and reciprocal assurances needed for Saudi Arabia to consider additional nonproliferation steps or to select U.S.-aligned reactor technologies. Recent developments during the Saudi Arabia Crown Prince Mohammed Bin Salman's visit to Washington reinforce this possibility: the announcement of a joint declaration on civil nuclear cooperation signaled political momentum, even if key technical and legal issues remain under negotiation. For the United States, a civil nuclear agreement with Saudi Arabia would carry diplomatic and commercial significance; for Riyadh, it could help secure U.S. backing for its long-term nuclear ambitions while balancing localization and its national development priorities.

Taken together, these dynamics illustrate how Saudi Arabia's nuclear ambitions intersect with broader questions of technology governance, alliance coordination, and industrial competitiveness. This paper traces the evolution of Saudi Arabia's civilian nuclear program and examines how shifting legal, commercial, and strategic conditions shape its engagement with potential suppliers. The first section outlines the Kingdom's domestic nuclear architecture—including its institutional framework, operator model, and localization strategy, and assesses the economic rationale underpinning its pursuit of nuclear power. The second section analyzes the financing architecture behind Saudi Arabia's nuclear ambitions, focusing on K.A.CARE's institutional role, emerging state-backed funding mechanisms, and the development of a long-term investment and lifecycle-cost framework. The third section evaluates South Korea's nuclear export model and the constraints arising from its technological interdependence with the United States, as well as recent alliance developments affecting joint exports. The final section draws policy implications for the U.S.-ROK alliance, arguing that the Saudi case has become a proving ground for whether allied partners can align competitiveness, governance, and credibility into a coherent export strategy in the era of the global energy transition.

2. Saudi Arabia's Economic Rationale

Saudi Arabia's pursuit of nuclear energy spans nearly two decades, beginning in 2005 when it signed the IAEA Small Quantities Protocol, reflecting minimal nuclear activities at the time. The Kingdom gradually built the foundation for a civilian nuclear program through strategic initiatives including the establishment of King Abdullah City for Atomic and Renewable Energy (K.A. CARE) in 2010 and the launch of Vision 2030 in 2016, which positioned nuclear energy as integral to economic diversification. The creation of the Nuclear and Radiological Regulatory Commission (NRRC) in March 2018 established an independent body to oversee nuclear safety and regulatory compliance. Procurement activities then advanced steadily, with tender deadlines set in December 2022 for four international suppliers: the China National Nuclear Corporation (CNNC), Électricité de France (EDF), the Korea Electric Power Corporation (KEPCO), and Rosatom State Atomic Energy Corporation (Rosatom) of Russia. Each bidder represents a different strategic partnership model, ranging from state-backed financing (China, Russia) to market-based and regulatory-aligned offers (France, South Korea). Final bids were submitted by December 2023, marking a key milestone in Saudi Arabia's move from planning to implementation. The United States did not formally submit a bid for Saudi Arabia's nuclear tender because no U.S. company currently holds an export license to sell nuclear reactor technology to the Kingdom under existing nonproliferation regulations. Under the Atomic Energy Act, the U.S. government requires a Section 123 Agreement before any American company can export nuclear technology or major components. Saudi Arabia has not yet signed such an agreement, unlike the United Arab Emirates, which did so in 2009. The trajectory culminated in July 2024 when Saudi Arabia voluntarily requested rescission of its Small Quantities Protocol, demonstrating commitment to enhanced international oversight as its nuclear ambitions expanded.³⁾ This transition became official on December 31, 2024, marking full implementation of Comprehensive Safeguards Agreement requirements

3) Francois Murphy, "Saudi Arabia Plans to Allow Tougher Nuclear Oversight by IAEA This Year," *Reuters*, September 16, 2024, <https://www.reuters.com/world/middle-east/saudi-arabia-plans-allow-tougher-nuclear-oversight-by-iaea-this-year-2024-09-16/>.

including complete facility declarations, regular IAEA inspections, and detailed nuclear material reporting. This evolution from minimal oversight to comprehensive safeguards reflects Saudi Arabia's strategic approach to developing civilian nuclear capabilities while strengthening nonproliferation commitments and positioning itself as a responsible stakeholder in international nuclear governance frameworks.

The introduction of nuclear energy into the Kingdom's power mix is ultimately driven by the goal of diversifying both the economy and the energy sector away from hydrocarbons. As of 2023, the U.S. Energy Information Administration (EIA) reported that oil accounted for roughly 38% of Saudi Arabia's electricity generation.⁴⁾ Natural gas remains the dominant source of power, consistently providing about 62% of total electricity generation.⁵⁾ Together, these figures underscore the Kingdom's continued reliance on hydrocarbons for its domestic energy needs. Under Vision 2030, Saudi Arabia has sought to rebalance this mix. Nuclear power, alongside renewables, has therefore been identified as a strategic alternative to sustain energy security while supporting long-term decarbonization goals. The Kingdom aims to generate half of its electricity from renewables and the other half from natural gas by 2030, a target that reflects both its diversification agenda and its effort to preserve oil for export.

In terms of the regulatory framework, KACST (King Abdulaziz City for Science and Technology)⁶⁾ leads on research and scientific cooperation, conducting studies with universities and the Ministry of Energy, and providing upstream R&D and analytical support. K.A.CARE (King Abdullah City for Atomic and Renewable Energy),⁷⁾ by contrast, leads the development of nuclear and renewable technologies, supporting localization, lab infrastructure, and human-capital programs. The **Nuclear and**

4) U.S. Energy Information Administration, *"International — Overview: Saudi Arabia,"* accessed October 24, 2025, <https://www.eia.gov/international/overview/country/sau>.

5) Ibid.

6) King Abdulaziz City for Science and Technology (KACST), *"Research Fields,"* accessed October 24, 2025, <https://kacst.gov.sa/internal/research-fields>.

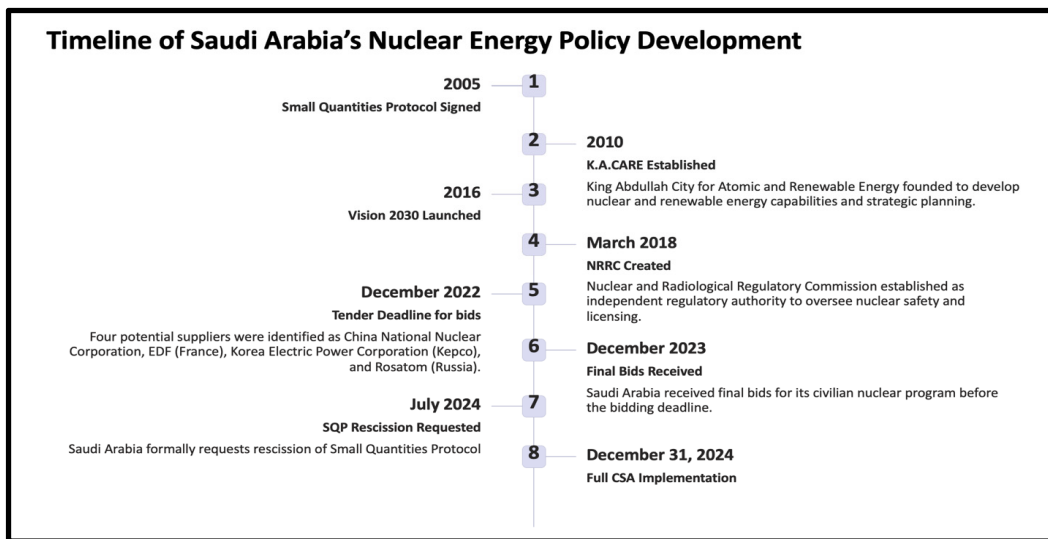
7) King Abdullah City for Atomic and Renewable Energy (K.A. CARE), *"Projects & Initiatives,"* accessed October 24, 2025, <https://energy.gov.sa/en/Sectors/Pages/ProjectsInitiatives.aspx?csrt=7839862444102710127>.

Radiological Regulatory Commission (NRRC) is the independent regulator, which licenses and oversees compliance across nuclear activities. Together, these entities constitute the backbone of Saudi Arabia's nuclear governance system, linking research, implementation, and regulatory oversight under a unified national framework.

Within this framework, the Ministry of Energy envisions nuclear energy as a firm baseload source that complements intermittent renewables such as solar and wind, which are expanding quickly but remain constrained by storage and reliability limitations. In this sense, nuclear energy represents not only a technological investment but also a structural hedge against the volatility of global hydrocarbon markets. Compared with renewables, nuclear offers stability and high utilization rates, typically between 92 and 95 percent,⁸⁾ making it essential for maintaining grid reliability. While Saudi Arabia has added around 10 GW of renewable capacity and aims to reach 130 GW by 2030⁹⁾, officials acknowledge that renewables cannot yet operate as stand-alone baseload sources due to intermittency and high storage costs. Battery systems remain expensive and sensitive to local climate conditions, particularly dust and heat, which increase maintenance requirements. In that sense, renewables can share part of the load but remain insufficient on their own, reinforcing the Kingdom's view that nuclear and fossil fuels must anchor the energy mix, with renewables playing a supporting role.

8) U.S. Department of Energy, Office of Nuclear Energy, "Nuclear Power Is the Most Reliable Energy Source and It's Not Even Close," March 24, 2021, <https://www.energy.gov/ne/articles/nuclear-power-most-reliable-energy-source-and-its-not-even-close>.

9) Rawan M. Alfehaid and Karen E. Young, "Saudi Arabia's Renewable Energy Initiatives and Their Geopolitical Implications," *Center on Global Energy Policy, Columbia University*, October 29, 2024, <https://www.energypolicy.columbia.edu/saudi-arabias-renewable-energy-initiatives-and-their-geopolitical-implications/>



Timeline of Saudi Arabia's nuclear energy policy development, made by the author

There is an ongoing debate suggesting that Saudi Arabia's interest in developing the full nuclear fuel cycle may conceal latent ambitions to acquire military-relevant technologies, particularly in response to Iran's nuclear trajectory. The recent Saudi-Pakistan defense cooperation agreement (2025) has fueled speculation that Riyadh could someday leverage Islamabad's nuclear expertise or deterrent capability. While such claims attract attention, they often conflate two distinct issues: the Kingdom's civilian nuclear program and its conditional security hedge in the event of a nuclearized Iran.

Crown Prince Mohammed bin Salman has stated on several occasions that Saudi Arabia would match an Iranian bomb if Tehran were to acquire one¹⁰), but these remarks were made prior to the 2022 normalization agreement with Iran. Since then, relations between Riyadh and Tehran have improved markedly, with diplomatic channels restored and cooperation expanding on regional issues. While mistrust persists, there is no current evidence that Saudi Arabia's civilian nuclear program has a military dimension. Rather, the strategic calculus remains rooted in maintaining

10) Julian Borger, "Crown Prince Confirms Saudi Arabia Will Seek Nuclear Arsenal If Iran Develops One," *The Guardian*, September 21, 2023, <https://www.theguardian.com/world/2023/sep/21/crown-prince-confirms-saudi-arabia-seek-nuclear-arsenal-iran-develops-one>.

energy security, technological modernization, and self-sufficiency within the international nonproliferation framework.

Beyond energy diversification, Saudi Arabia's growing interest in the full nuclear fuel cycle adds another layer to its strategy.¹¹⁾ According to geological assessments conducted with Chinese partners in 2020, Saudi Arabia reportedly possesses an estimated 90,000 metric tons of uranium ore, largely located in the northwestern region near NEOM.¹²⁾ Additional potential exists in phosphate deposits and desalination brine, indicating a long-term opportunity for self-sufficient fuel supply. This was part of a larger plan to be a global leader in the mining sector and diversify the nation's energy mix away from oil. Saudi officials, including Energy Minister Prince Abdulaziz bin Salman, have articulated the intent to develop the entire nuclear fuel cycle, encompassing uranium mining, conversion, and the production of low-enriched uranium (LEU). In early 2023, the Minister publicly stated that Riyadh aims to produce yellowcake and LEU domestically. However, both the IAEA and OECD Nuclear Energy Agency have noted that uranium extraction in Saudi Arabia may be economically marginal at current prices and would require strong regulatory, environmental, and financial frameworks.¹³⁾ This interest in mastering the peaceful fuel cycle should therefore be interpreted not as a step toward weaponization, but as a means of securing energy sovereignty and supply resilience, an objective consistent with Saudi Arabia's broader industrial localization goals.

3. Building Domestic Nuclear Capabilities

While resource endowment shapes Saudi Arabia's long-term ambitions, implementation ultimately depends on institutional and technical capacity. On the

11) Yousef Saba and Aziz El Yaakoubi, "Saudi Arabia Plans to Use Uranium for Entire Nuclear Fuel Cycle, Minister Says," Reuters, January 11, 2023, <https://www.reuters.com/business/energy/saudi-arabia-plans-use-uranium-entire-nuclear-fuel-cycle-minister-says-2023-01-11/>

12) Emma Graham-Harrison, "Revealed: Saudi Arabia May Have Enough Uranium Ore to Produce Nuclear Fuel," *The Guardian*, September 17, 2020, <https://www.theguardian.com/world/2020/sep/17/revealed-saudi-arabia-may-have-enough-uranium-ore-to-produce-nuclear-fuel>.

13) International Atomic Energy Agency, "Annual Report for 2023," July 2024 (Vienna: IAEA), <https://www.iaea.org/publications/reports/annual-report/2023>.

technical front, capacity-building remains both the main challenge and opportunity of Saudi Arabia's nuclear program. Riyadh's preferred model combines project finance, a structure where lenders rely on the project's future revenues rather than the sponsors' balance sheets, with an Engineering, Procurement, and Construction (EPC) contract. Under this *turnkey* approach, a single contractor handles all stages from design to commissioning, delivering a fully operational plant at a fixed cost and schedule.¹⁴⁾ This integrated model is considered bankable because it provides lenders and investors with confidence in cost, timeline, and performance. The EPC contract transfers most construction and delivery risks from the project owner to the contractor, ensuring greater financial predictability and accountability. It also streamlines coordination, accelerates implementation, and aligns incentives between the contractor and the project owner through built-in performance guarantees.

The Kingdom has publicly stated a long-term ambition of reaching around 17 gigawatts of nuclear generation capacity by 2040. It plans to begin with its first commercial power station at Khor Duwaiheen, one of two coastal sites, which is expected to deliver roughly 2.8 gigawatts of output as part of the Saudi National Atomic Energy Project (SNAEP) under the oversight of K.A.CARE and the Ministry of Energy.¹⁵⁾ In parallel, Saudi Arabia emphasizes technology and training transfer, including partnerships with experienced operators, on-the-job placements at reference plants abroad, and the establishment of local training simulators through KACST and KACARE. Together, these elements aim to build the Kingdom's long-term technical and operational capacity while reducing dependence on foreign expertise.

Unlike the UAE's Barakah model—which relies on a foreign-domestic consortium structure for construction, operation, and long-term management—Saudi Arabia's nuclear strategy is built around national ownership and operations. In the UAE, the

14) Global Trade Funding, "Project Finance Documents | Engineering, Procurement & Construction (EPC) Contracts," accessed October 24, 2025, <https://globaltradefunding.com/project-finance/project-finance-documents/epc-contracts/>

15) Shahad Turkistani and Amal Altwaijri, "Why US-South Korea Coordination Matters for Saudi Arabia's Nuclear Energy Program," *The National Interest*, November 17, 2025, <https://www.nationalinterest.org/blog/energy-world/why-us-south-korea-coordination-matters-for-saudi-ara-bias-nuclear-energy-program>.

Emirates Nuclear Energy Corporation (ENEC) and KEPCO jointly own both the operating company and the commercial entity, with KEPCO formally helping to operate the plant.¹⁶⁾ By contrast, Saudi Arabia has already designated a national Saudi operator for its first nuclear power plant. According to the 2024 K.A.CARE Annual Report, Duwaiheen Nuclear Energy Company is “the owner and operator of the plant,” underscoring the Kingdom’s commitment to domestic operational control rather than relying on a foreign consortium. The report further notes that K.A.CARE provides technical and engineering support to Duwaiheen to ensure the plant meets the highest safety standards, reinforcing the focus on building sovereign national capability.¹⁷⁾

Saudi strategy is closely tied to workforce nationalization, technology localization, and the development of domestic human capital. As Nora Mansouri explains, the Kingdom requires vendors to meet minimum local-content requirements, employ Saudi workers, and cooperate in domestic R&D development, conditions fundamentally incompatible with long-term foreign operational control.¹⁸⁾ In line with Vision 2030’s broader industrial strategy, Saudi Arabia aims for Saudi engineers, technicians, and regulators to progressively assume responsibility for all operational, regulatory, and oversight functions, embedding nuclear expertise within national institutions.

In practice, implementation of this model involves sequencing human-capital development through established K.A. CARE and KACST training pipelines, IAEA courses, and on-the-job immersion at reference plants such as Barakah or Korean APR-1400 units. Accelerating the fueling and commissioning of the low-power research reactor (LPRR)—constructed under KACST, remains critical to providing hands-on operational training and regulatory exercises for the NRRC. This integrated

16) Emirates Nuclear Energy Corporation (ENEC), ENEC and the Barakah Nuclear Energy Plant Factsheet. <https://www.enec.gov.ae/doc/enec-factsheet-enec-and-barakah-plant-eng-62c6888dabdb0.pdf>

17) King Abdullah City for Atomic and Renewable Energy (K.A.CARE), Annual Report 2024.

18) Nora Mansouri, “*The Saudi Nuclear Energy Project*” (Commentary, Saudi Association for Energy Economics, January 2020), <https://www.saudi-aee.sa/wp-content/uploads/2022/01/3-The-Saudi-Nuclear-Energy-Project.pdf>.

approach not only reinforces institutional readiness but also reduces long-term dependence on foreign O&M expertise. By combining financial innovation, technology transfer, and workforce localization, Saudi Arabia's nuclear strategy seeks to achieve operational self-reliance, strengthen energy security, and position the Kingdom as a credible and responsible newcomer in the global civil-nuclear arena.

4. Nuclear Financing Architecture

According to the 2024 Annual Report by K.A.CARE, the Saudi government has made substantial progress in establishing the financial and institutional foundations for the Kingdom's first nuclear power plant.¹⁹⁾ The report details work toward an optimal financing and commercial model, including the development of draft Shareholders' and Power Purchase Agreements (PPAs), coordination with the National Infrastructure Fund to structure funding mechanisms, and collaboration with the Insurance Authority to design project risk coverage. It also highlights coordination with the IAEA to advance regulatory and technical readiness, and the launch of a Sustainable Financing Strategy aimed at identifying long-term funding sources for nuclear and waste-management projects. Building on these institutional efforts, Saudi Arabia's emerging financing approach reflects a state-backed, risk-sharing framework rather than reliance on purely private or vendor-led investment.

Under SNAEP, plans are underway to establish a Nuclear Holding Company (SNEH) under K.A.CARE to invest in nuclear assets both domestically and abroad through joint ventures and partnerships with technology suppliers and private investors.²⁰⁾ According to the Saudi Arabia's governor to the IAEA, SNEHC is authorized to participate in nuclear economic projects both locally and internationally, operate and develop nuclear facilities for electricity generation and desalinated water, and help shape the strategy for developing domestic human capital in the nuclear sector. In practice, this positions SNEHC as the platform through which Saudi Arabia can negotiate joint development arrangements, structure long-term operational

19) King Abdullah City for Atomic and Renewable Energy (K.A.CARE), Annual Report 2024.

20) Ibid

partnerships, and align foreign technology suppliers with national strategic objectives.²¹⁾ Complementing this framework, the 2025 Energy Observatory Journal, published by K.A.CARE, emphasizes that financial sustainability and lifecycle management are central pillars of Saudi Arabia's nuclear strategy.²²⁾ It notes ongoing efforts to incorporate radioactive waste management, decommissioning finance, and lifecycle costing into the project's investment design, ensuring fiscal responsibility and transparency over the full operational horizon. Collectively, these measures illustrate a financing framework grounded in predictable cash flows, transparent contingent-liability allocation, and lifecycle cost visibility, all of which are critical for nuclear new-build.

5. South Korea's Nuclear Export Model and Alliance Dynamics

South Korea is now recognized as one of the world's leading nuclear energy nations, possessing full-cycle capabilities in the design, construction, and export of nuclear power plants (NPPs). The year 2009 marked a major turning point in this trajectory, as South Korea's successful bid, led by KEPCO to build four APR-1400 reactors in the United Arab Emirates, transformed the country's status from a regional operator into a competitive global supplier of nuclear technology.²³⁾ It was a consortium between key Korean companies, with Westinghouse Electric Company providing technical licensing and design support.²⁴⁾ The consortium's victory, achieved over well-established contenders from France, Japan, and the United States, was attributed to its ability to offer a technically robust yet cost-effective package supported by a strong construction record and government-backed financing. Since then, South

21) Ibid

22) King Abdullah City for Atomic and Renewable Energy (K.A.CARE), Energy Observatory Journal, 2025.

23) Amena Bakr and Cho Mee-young, "South Korea Wins Landmark Gulf Nuclear Power Deal," *Reuters*, December 27, 2009, <https://www.reuters.com/article/business/autos-transportation/south-korea-wins-landmark-gulf-nuclear-power-deal-idUSLDE5BQ05O>.

24) Mark Holt, *"U.S. and South Korean Cooperation in the World Nuclear Energy Market: Major Policy Considerations"* (Congressional Research Service Report R41032, June 25, 2013), <https://www.congress.gov/crs-product/R41032>.

Korea has consolidated its position in overall export competitiveness and project delivery performance.

The UAE's Barakah project marked Korea's definitive breakthrough in 2009.²⁵⁾ Beyond engineering, Korea's long-term commitment, through an 18% equity stake in both Barakah One Company and Nawah Energy Company, signaled a strategic, risk-sharing model that appealed to buyers seeking durable partnerships.²⁶⁾ The APR-1400's subsequent certifications by the European Utility Requirements (2017) and the U.S. Nuclear Regulatory Commission (2019/2020) further reinforced its credibility and bankability for future exports.²⁷⁾

While the ROK-U.S. alliance initially underpinned Seoul's nuclear rise, through technology transfer, regulatory cooperation, and shared nonproliferation norms, the maturation of Korea's capabilities has introduced a measure of competitive tension. In 2022, both Westinghouse and KHNP competed for Poland's first nuclear power plant; U.S. diplomatic pressure helped secure the AP1000 selection for the initial site, even as Poland pursued a parallel Korean project at another location.²⁸⁾ This competition underscored Washington's use of energy diplomacy to protect its market share. The Westinghouse-KHNP intellectual property dispute, also in 2022, further exposed the structural interdependence between the allies. Westinghouse sued KHNP and KEPCO in a U.S. court, claiming that South Korea's APR-1400 reactor used U.S.-licensed System 80+ technology and could not be exported without its consent.²⁹⁾ This tension became particularly evident in mid 2025, when Business

25) U.A.E. Completes First of Four Korean-Built Nuclear Reactors," *Bloomberg*, March 26, 2018, <https://www.bloomberg.com/news/articles/2018-03-26/u-a-e-completes-korean-built-nuclear-power-plant-seoul-says>.

26) Emirates Nuclear Energy Company (ENEC), "About ENEC Commercial," accessed October 24, 2025, <https://www.enec.gov.ae/our-subsidaries/enec-commercial/>.

27) International Atomic Energy Agency, *IAEA Annual Report 2020*, GC (65)/5 (Vienna: IAEA, 2021), <https://www.iaea.org/sites/default/files/2023-04/gc65-5.pdf>.

28) KHNP Pulls Polish Nuclear Plans, Clearing Way for US," *Central European Times*, August 25, 2025, <https://centraleuropeantimes.com/khnp-withdraws-from-polish-nuclear-projects-clears-way-for-us-2/>.

29) U.S. Court Dismisses Westinghouse Case Against Korea," *World Nuclear News*, July 14, 2023, <https://www.world-nuclear-news.org/articles/us-court-dismisses-westinghouse-case-against>

Korea reported that the United States had urged South Korea to employ Westinghouse's AP1000 reactor model for the Saudi bid, despite KEPCO's existing APR1400 proposal.³⁰⁾ The development underscored a deeper question about how allied partners coordinate their export policies in competitive third-country markets. Shortly thereafter, the settlement of intellectual property disputes between Westinghouse, KEPCO, and KHNP, along with a new U.S.-ROK Memorandum of Understanding on nuclear export cooperation, demonstrated that collaboration was still possible, provided both sides reconcile regulatory control with commercial flexibility.³¹⁾ The settlement led KHNP to withdraw from a planned Polish project but also cleared legal uncertainty for future joint ventures between the two firms. Although the court later dismissed the lawsuit, tensions persisted as both companies competed for projects in Europe, including Poland and the Czech Republic. Overall, the case underscored South Korea's continued export dependence on U.S.-licensed technology, a factor that shapes its ability to compete and cooperate in third-country nuclear markets.

Following the settlement, attention shifted from litigation to policy alignment, culminating in the October 2025 decision to begin revising the 2015 U.S.-ROK civil nuclear cooperation pact. South Korean Foreign Minister Cho Hyun confirmed that the United States had accepted Seoul's proposal to begin discussions well before the pact's 2035 expiration.³²⁾ The decision reflects Seoul's growing energy-security and industrial concerns: South Korea operates 26 commercial reactors, relies entirely on imported nuclear fuel, and is approaching saturation of its spent-fuel storage pools. Cho underscored that Seoul's request is driven not by security motives but by commercial and environmental imperatives, as domestic fuel-cycle capacity is

-korea.

30) Michael Herh, "Allies Set to Open Nuclear Talks to Expand Seoul's Fuel-Cycle Rights," *Business Korea*, October 23, 2025, <https://www.businesskorea.co.kr/news/articleView.html?idxno=254118>.

31) U.S. Department of Energy, "Joint Statement of the United States of America and the Republic of Korea on the Expansion of Peaceful Nuclear Energy," January 10, 2025, <https://www.energy.gov/articles/joint-statement-united-states-america-and-republic-korea-expansion-peaceful-nuclear-energy>.

32) Allies Set to Open Nuclear Talks to Expand Seoul's Fuel-Cycle Rights," *Korea Herald*, October 23, 2025, <https://m.koreaherald.com/article/10599944>

becoming essential to maintain the country's reactor fleet and support the export of next-generation SMRs. The United States, while cautious about nonproliferation implications, acknowledged these arguments as part of broader alliance discussions on trade and security.

This development carries important strategic implications. Expanding South Korea's fuel-cycle rights under U.S. oversight would enhance the alliance's collective competitiveness in global nuclear markets, strengthen supply-chain resilience, and enable more credible joint bids in third countries, particularly in the Middle East. The planned negotiations thus signal a maturing alliance, one moving beyond export disputes toward a more institutionalized model of nuclear partnership, balancing technological interdependence with strategic autonomy.

Additionally, a parallel development further illustrates this strategic shift. In November 2025, the United States and South Korea issued a joint fact sheet that included U.S. support for Seoul's pursuit of nuclear-powered submarines, alongside expanded cooperation in civil nuclear technology and supply-chain integration.³³⁾ Although focused on naval propulsion, the announcement reflects a deeper alignment between the two countries in nuclear-industry development, signaling a willingness by Washington to accommodate Seoul's long-standing ambitions in sensitive nuclear domains. This elevation of the nuclear partnership, extending from export controls to advanced propulsion technology, suggests an emerging model in which allied cooperation is structured around trusted technology governance rather than narrowly defined restrictions. For the Saudi case, this evolution implies that Washington and Seoul may be increasingly incentivized to coordinate rather than compete in third-country markets, creating the conditions for a more coherent allied export strategy.

33) The White House, "Joint Fact Sheet on President Donald J. Trump's Meeting with President Lee Jae Myung," November 13, 2025.

6. Policy Implications and Strategic Outlook

Saudi Arabia's nuclear case offers South Korea an opportunity to reinforce its role as both a leading exporter and a policy coordinator within the alliance, in an increasingly competitive global market. For the U.S.-ROK partnership, it underscores that technological cooperation alone is insufficient; what now matters is the policy coherence governing how allied states compete and cooperate in third-country nuclear projects.

The Saudi tender exposes a persistent coordination gap within the alliance. While Washington continues to exercise regulatory and intellectual property leverage over South Korean exports, Seoul's growing industrial autonomy has produced overlapping, and at times conflicting, commercial agendas. This misalignment risks sending mixed signals to potential buyers such as Riyadh, where credibility, consistency, and governance standards weigh as heavily as reactor technology itself. Aligning diplomatic messaging, export licensing, and financing support under a joint nuclear export framework—similar to the Japan-U.S. civil nuclear partnership—would strengthen allied competitiveness while maintaining nonproliferation integrity.

At the same time, recent developments highlight emerging areas of alliance convergence. The U.S. decision in 2025 to begin early renegotiation of the 123 Agreement, and to support South Korea's pursuit of nuclear-powered submarines and expanded nuclear-industry cooperation, reflect a broader shift toward a trusted-partner model in sensitive nuclear domains.¹² These moves signal that Washington increasingly recognizes Seoul's industrial and technological maturity, and is prepared to accommodate a more reciprocal partnership. Such trends create a foundation for a more coherent allied approach to civilian nuclear exports, including in strategically significant markets like Saudi Arabia.

Riyadh's strong preference for localization also challenges the traditional vendor-buyer dynamic. To remain competitive, the U.S.-ROK partnership must evolve beyond a purely technology-driven model toward a strategic co-export framework that integrates training, risk-sharing, and regulatory cooperation. Such an approach would assure recipient states that Western partnerships offer not only

safety and compliance but also long-term capacity-building and localized capability transfer, areas of strength for both Seoul and Washington.

The 2022-2025 Westinghouse-KHNP dispute demonstrated that intellectual-property dependencies, if poorly managed, can become strategic liabilities. Over time, introducing more flexibility into the implementation of Section 123 provisions and re-export conditions could enhance allied adaptability in emerging markets, especially when competing with state-backed suppliers offering comprehensive fuel-cycle services and long-term finance.

Ultimately, how Washington and Seoul manage this convergence will shape not only their commercial prospects in Saudi Arabia, but also the credibility of allied technology governance in an era of decarbonization and intensifying global competition over nuclear supply chains.

7. Conclusion

Saudi Arabia's pursuit of nuclear energy reflects pragmatic economic and strategic considerations rather than latent proliferation intent. Its approach centers on localization, capability-building, and long-term energy security; objectives that align with Vision 2030 and international nonproliferation norms. The Kingdom's choice of supplier will ultimately hinge on which partnership offers the most credible balance of technological reliability, financing flexibility, and institutional cooperation.

For Seoul and Washington, the Saudi case functions as a proving ground for allied coordination in the global energy transition, testing whether the ROK-U.S. alliance can integrate competitiveness, governance, and credibility into a coherent export strategy.

The outcome of the Saudi nuclear tender will serve as a benchmark for how alliances can adapt to the energy transition, linking industrial competitiveness with responsible governance in an era defined by both decarbonization and technological rivalry.

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VII. South Korea and the Battery Economy: Middle Powers and the Management of Supply-Chain Bifurcation during the U.S.-China Rivalry

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1. Introduction

How do middle powers transform great-power competition into functional economic interdependence during periods of systematic bifurcation? I define systemic bifurcation as the reorganization of a single global economy into rival but interdependent subsystems, distinct political and regulatory blocs that remain linked through production, finance, and technology even as they compete for control over standards and critical infrastructures. The contemporary U.S.-China relationship illustrates what is often described as decoupling, a selective disentangling of financial, investment, technological, and human capital networks that once sustained a single global economy (Zhang & Chen, 2023). From semiconductors and electric vehicles to critical minerals and digital infrastructure, Washington and Beijing are building parallel architectures of production and innovation (Xu et al., 2023). Yet this separation is partial and uneven because complete autarky is neither feasible nor desirable between great powers especially when the world is still bounded by market scale, shared technology, and cross-border capital (Gong et al., 2021). When deep interdependence allows a rising power to close the technological gap with a hegemon, the incumbent reorganizes globalization around trusted partners to restore control over production, finance, and knowledge. Middle **powers** make this reorganization feasible (Siniver & Tsourapas, 2023). They translate geopolitical positioning into the investment plans, new standards, and financial systems that keep the economic relationships functioning inside new political boundaries. In doing so, middle powers prevent systemic rupture even as great powers compete to rebuild technological and economic asymmetry.

Scholars of great-power competition have long debated how systemic rivalry transforms the structure of the global economy. Realist and power-transition

theorists such as Robert Gilpin (1981) and A.F.K. Organski (1958) argued that hegemonic orders unravel when rising powers narrow the technological and economic gap with incumbents, compelling dominant states to defend their positions through coercion or institutional reform. More recent analyses view the U.S.-China relationship as a classic case of this dynamic, with economic interdependence amplifying strategic anxiety rather than dampening it (Hung 2015; 2022, Mearsheimer, 2019; Allison, 2017). At the same time, institutionalists like G. John Ikenberry (2011) suggest that liberal orders endure by adapting their rules and incorporating capable allies, while Henry Farrell and Abraham Newman (2019) extend this logic to networked globalization, showing how dominant states weaponize interdependence through control of critical nodes such as finance, data, and technology. Yet these perspectives largely center the hegemon and the challenger, leaving under-examined the middle powers that operationalize great-power strategy on the ground. This paper builds on that gap by arguing that middle powers, through their industrial capacity, financing institutions, and regulatory diplomacy, keep the system going by translating geopolitical rivalry into the infrastructures and routines that allow interdependence to endure under division.

I argue that that middle powers function as the system integrators of an increasingly divided global economy. First, they translate geopolitical strategy into technical and financial architectures, converting abstract directives from great powers into operational infrastructures of production, investment, and trade. Second, they bridge between rival regulatory and institutional regimes, ensuring that standards, contracts, and compliance systems remain interoperable across competing blocs. Third, they coordinate flows of capital and technology through state-backed finance, industrial planning, and cross-border partnerships that sustain circulation under political constraint. Fourth, they diffuse stability by embedding predictability and rule-based behavior within the institutions, routines, and standards that structure global exchange. Fifth, they adapt continuously, absorbing shocks and reconfiguring networks so that interdependence persists even under rivalry. Through these interlinked functions, middle powers convert systemic division into managed interdependence, keeping the global economy operational amid fragmentation.

Empirically, I draw from government reports, corporate records, and publicly-available data to argue that middle powers such as South Korea are indispensable because they possess the production capacity, technological know-how, and regulatory credibility to re-route value chains without destroying them (Maris et al., 2022). Their systemic function unfolds through five mechanisms. Through industrial intermediation, Korean firms such as LG Energy Solution, SK On, and Samsung SDI transform geopolitical directives into production systems that link Western regulations with East Asian supply bases. Their gigafactories in the United States, Australia, and Europe reproduce the same technical standards and equipment families as their facilities in Korea, ensuring that industrial integration continues across political divides. Next, Korean public banks and corporate consortia mobilize capital for compliant facilities and mineral projects, converting alliance commitments into investment frameworks that sustain throughput. In terms of institutional credibility, Korea embeds traceability and due-diligence protocols in manufacturing, enabling firms to meet U.S. subsidy and audit requirements while maintaining trust among Western partners. Furthermore, through controlled connectivity, Korea preserves limited access to Chinese processing and Southeast Asian intermediates, ensuring material continuity even under tightening trade and security rules. And finally, through standard diffusion, Korean producers disseminate design templates, quality norms, and ESG verification systems that shape global compliance regimes. Together, these mechanisms transform strategic vulnerability into industrial leverage, demonstrating how middle powers convert fragmentation into a managed and reproducible economic order (Samsung SDI, 2025; LG Energy Solutions, 2024; KED Global, 2020).

2. Middle Powers as System Integrators of the Global Economy

Periods of system wide integration represent the height of an interdependent global hegemony. A dominant power stabilizes the international economy by distributing public goods such as security, liquidity, technological diffusion, and rule enforcement that enable global accumulation. Gilpin's (1981) *War and Change in World Politics* conceptualizes hegemony as the provision of collective goods for private gain, where

the hegemon sustains order because the benefits of stability exceed the costs of leadership. Yet, as Susan Strange (1988) argues, hegemony ultimately rests not on direct control but on *structural power*, the capacity to shape the frameworks of production, finance, knowledge, and security that define how others operate. In such periods of dominance, interdependence becomes the organizing principle of the system. The hegemon's norms and institutions extend outward, aligning trade, technology, and capital flows with its strategic interests. However, this integration contains the seeds of its own undoing. As Gilpin and Arrighi (1994) both note, expansion enables diffusion. Rising powers internalize technologies, accumulate capital, and cultivate their own productive capacities. Over time, the hegemon's relative advantage declines, even as its rules persist. World systems theorists such as Wallerstein (1974) interpret this as the structural rhythm of capitalism, where the spread of productive forces eventually destabilizes the hierarchy that first enabled them.

This dynamic generates recurrent crises of adjustment. As Organski's (1958) power transition theory argues, these crises are moments of disequilibrium when the distribution of power diverges from the existing institutional order. The incumbent seeks to preserve the privileges of leadership while accommodating new claimants, whereas rising powers demand rule change commensurate with their growing capabilities (Organski & Kugler, 1980). For both Neo-Gramscian or structural Marxists, such as Cox (1987) and Arrighi (1994), these are not merely political disputes but crises of accumulation and legitimacy. As production migrates outward and profits compress, financialization and military spending at the core substitute for productive renewal, signaling the exhaustion of the existing hegemonic cycle. This structural contradiction intensifies uneven development across regions and sectors, forcing both state and corporate actors to reorganize the foundations of production, logistics, and finance (Harvey, 2003). The resulting pressure propels the system toward bifurcation, the fragmentation and reconfiguration of previously integrated circuits of accumulation, governance, and exchange into competing yet interdependent architectures of global order.

This results in systematic bifurcation, which manifests not in diplomacy or ideology

but in the material organization of global supply chains (Coe & Yeung, 2015). As the circuits of production, logistics, and technology become deeply intertwined, the interdependence that once sustained integration begins to generate strategic exposure (Farrell & Newman, 2019). Supply chains originally designed for efficiency, cost reduction, and just in time delivery transform into sites of vulnerability when geopolitical rivalry redefines what counts as reliable or secure. This transformation initiates what can be described as supply chain bifurcation, the initial and most concrete step toward broader systemic bifurcation. In this phase, states and firms reorganize production networks around spheres of trust, aligning sourcing, finance, and technological standards with political alliances. The pursuit of resilience displaces the pursuit of efficiency, privileging redundancy, verification, and bloc based control. For world-systems theorists, this marks capitalism's latest spatial fix, the relocation and reconfiguration of accumulation across new territorial, regulatory, and technological boundaries to manage the contradictions of globalization and defer crisis without dismantling interdependence itself (Harvey, 2003).

Systematic bifurcation, however, does not signal the end of globalization. Rather, it marks its recalibration. Ikenberry's (2011) theory of liberal order helps explain why liberal systems persist through adaptation, not closure. The hegemon maintains legitimacy by renegotiating its institutions and delegating functional authority to allies that share its regulatory and technological ethos (Keohane, 1984). Strange's (1994) structural power lens reinforces this point, showing that when direct dominance becomes unsustainable, control migrates to the rules and infrastructures that govern interdependence. Power becomes embedded in standards, contracts, and compliance regimes rather than territorial conquest. This process is simultaneously functional and political. It preserves economic exchange but redefines its governance. For Marxist political economy, this shift from productive to financial dominance is an attempt by capital to reconstitute its command through new organizational forms (Arrighi, 1994). The result is a managed globalization that substitutes full integration with a hierarchy of selective connectivity. The challenger replicates this strategy, creating competing but interoperable architectures of finance, production, and innovation (Farrell & Newman, 2019). The global economy

becomes a network of semi-overlapping systems rather than a single universal order.

This transition towards systemic bifurcation through supply chains highlights the indispensable role of middle powers. The reorganization of the global economy cannot be achieved solely by great powers; it depends on states with the institutional density, industrial capacity, and regulatory credibility to operationalize systemic change (Beeson, 2022). While traditional international-relations scholarship often describes middle powers as diplomatic brokers or norm entrepreneurs, I argue that their systemic role unfolds through five interlinked mechanisms. First, industrial intermediation refers to the translation of geopolitical imperatives, such as resilience, autonomy, and friend-shoring, into tangible industrial and technological infrastructures that preserve functionality across rival systems. Second, financial coordination captures how middle powers mobilize and redirect capital through banks, exchanges, and public credit agencies, sustaining liquidity and investment when direct flows are politically constrained. Third, institutional credibility denotes the creation of transparent and enforceable governance frameworks that make cooperation possible without political convergence. Fourth, controlled connectivity describes the maintenance of selective channels linking competing blocs, ensuring that economic circulation continues under conditions of division. Fifth, standard diffusion involves the propagation of compatible technologies, compliance regimes, and measurement systems that embed interoperability in a fragmented world economy. Through these mechanisms, middle powers transform rivalry into managed interdependence, preventing systemic competition from descending into structural collapse.

Ultimately, bifurcation represents the global economy's mechanism of renewal. It converts the contradictions of integration into a reconstituted hierarchy, redistributing productive and regulatory authority across a wider set of actors while maintaining systemic coherence (Arrighi, 1994; Gilpin, 1981). Middle powers are the agents of this renewal. They make bifurcation governable by turning abstract geopolitical strategies into operational architectures of production and exchange. Their structural position, deeply integrated yet politically flexible, allows them to reconcile efficiency with security of both powers, continuity with transformation.

As Gilpin and Arrighi both suggest, no hegemonic order collapses outright; it is reorganized around new axes of accumulation and authority. In this sense, the durability of globalization across crises and transitions has always hinged on the engineering, institutional, and normative capacities of middle powers, whose ability to manage bifurcation determines whether the next world economy will fragment or evolve. The next section illustrates how South Korea functions as a system-integrator in the current period.

3. South Korea and the Battery Economy: Middle Power Integration in the Age of U.S.-China Bifurcation

The present phase of systematic bifurcation is defined by rivalry between the U.S. and China over advanced manufacturing, critical minerals, and the rules that govern technology and finance (The Economist, 2023; CSIS, 2024). The material base of this contest is semiconductors, batteries, and the critical resources for defense assets, artificial intelligence, and digital infrastructure rather than coal or bulk steel. While there is a trend towards bifurcation, economic interdependence is not ending; it is being reorganized through states that can translate strategy into factories, standards, capital, and throughput. South Korea occupies the pivotal position as one of the middle countries in this process. It manufactures at the technological frontier of batteries, which depends almost entirely on imported minerals, and is embedded in a security alliance that now reaches deeply into industrial and regulatory coordination (Brookings Institution, 2023). In other words, South Korea ensure that rivalry does not halt circulation the circulation of these technologies, but is absorbed and routed through compliant channels.

The first mechanism is technological intermediation joined to industrial translation. Korean manufacturers stand at the hinge where Western regulatory regimes meet East Asian materials ecosystems, and they make those regimes mutually workable through design, process control, and documentation (Financial Times, 2023; Reuters, 2024). Battery producers that include LG Energy Solution, SK On, and Samsung SDI supply cells, modules, and packs to automakers and grid storage developers across

the United States and Europe. Their lines are tuned to multiple chemistries, from nickel rich recipes favored in premium vehicles to iron phosphate recipes gaining share in cost sensitive markets and stationary storage. The physical plants in the American Southeast and Midwest run under American labor and environmental rules, while sister plants in Korea and in Europe keep the same equipment families, quality routines, and traceability logic (KED Global, 2024). That mirroring allows rapid transfer of learning and keeps yields and cycle lives convergent across regions. Crucially, the underlying feedstocks still move through Asia for much of the anode and cathode precursor work. Korean engineers close the gap between those realities by engineering serial numbers and provenance into the product itself, qualifying dual suppliers for critical steps, and writing operating envelopes that meet Western standards even when the upstream is heterogeneous. The result is a distributed but standardized battery architecture that keeps electric vehicles and energy storage systems moving through a bifurcated economy without the need for a single dominant hub (Bloomberg, 2023). Korean firms make it possible for allied jurisdictions to reduce strategic exposure to China while preserving the scale economies that global demand still requires.

The second mechanism is alliance coordination joined to financial structuring. The security relationship between the United States and South Korea has become an industrial framework that shapes where factories are placed, how contracts are written, and which projects receive patient capital (CSIS, 2024; Yonhap, 2023). American incentives for clean vehicles and stationary storage link tax credits to the location of battery components and to the provenance of minerals. In addition, export controls and foreign entity rules create lines that firms must not cross if they want end products to qualify in allied markets. Korea treats these rules as design constraints. Ministries convene firms to map content and compliance. Public lenders and insurers align balance sheets with these strategic sectors. The Korea Development Bank, the Export Import Bank of Korea, and the Korea Trade Insurance Corporation extend loans, guarantees, and political risk coverage for battery plants, cathode and precursor projects, and upstream ventures that diversify exposure away from single points of failure (Korea JoongAng Daily, 2024). Large domestic pools such as the National

Pension Service coinvest in project vehicles that sit under these industrial moves. This is not a simple subsidy, but rather a transmission layer that absorbs dollar liquidity from global markets and recodes it as risk capital that fits allied law and Korean corporate practice. When new U.S. Treasury or Commerce rules alter eligibility definitions, Korean firms have standing working groups to adjust sourcing and documentation. In this way, security commitments become factory schedules, and diplomacy becomes an investment calendar. In other words, the U.S.-Korean alliance is not only military architecture. It is the template that directs where capacity will be bankable and how quickly it can be brought to nameplate output.

The third mechanism is institutional credibility, demonstrating it in the realm of critical resources. Since Korea has negligible domestic ore, it has chosen to make vulnerability into an organizing principle (Reuters, 2023; Oxford Analytica, 2024). The state adopted a formal list of strategic minerals, created a resource security council at cabinet level, set early warning thresholds, and mandated stockpiles and recycling targets. Korean consortia have placed equity and pre-finance into lithium projects in Australia and North America, secured nickel and cobalt flows processed in Indonesia and then routed into allied markets under evolving content rules, and backed midstream plants for cathode and anode materials near gigafactory clusters in the United States and Europe (Bloomberg NEF, 2024). Materials champions such as POSCO Future M and Ecopro have published multi-year targets for cathode output in the hundreds of thousands of tons by the end of the decade and have announced iron phosphate lines that complement their nickel rich families (KED Global, 2023). Alongside new mining and refining stands recycling, where the Korean government plans aim to lift recovery rates for a defined set of strategic inputs by the early next decade, and private plants for black mass and precursor regeneration are being sited near major load centers and ports. Upstream diversification is not a leap away from Chinese processing in one move. Instead, South Korea's institutional credibility builds a cost-competitive alternative within the system, allowing the compliant share of materials to expand as foreign-entity rules tighten, without disrupting overall throughput.

The fourth mechanism is connectivity. U.S. tax credits and public procurement now depend on documented origin, processing steps, and environmental and labor

conditions (Financial Times, 2024; Brookings Institution, 2023). Korea excels at converting those requirements into their industrial policy. The legislature adopted a special act on national resource security that defines responsibilities for risk monitoring, stockpiling, and coordination across ministries. Korean agencies developed a battery passport system that records where minerals were mined and processed, which plants transformed them, and which lines built the finished cell or pack (Yonhap, 2024). Firms embed serialization and chemical fingerprinting into manufacturing so that a cell's history can be traced through warranty claims or subsidy audits. Environmental and social metrics are tied to supplier contracts and are checked by third party audits that sync with American and European due diligence frameworks. It makes traceability an input that shapes plant design and supplier qualification from the start. Korea's courts, accounting standards, and corporate governance routines add enforcement and predictability. When automakers or utilities must certify eligibility for a credit or a public program, Korean documentation and quality systems are already aligned to the required proofs.

The fifth mechanism is diffusion. Korea cannot and does not attempt to sever all ties to the Chinese production sphere. A large share of processed and imported nickel, cobalt, manganese, and graphite still passes through Chinese plants (Bloomberg, 2023). At the same time, Korea is building parallel routes that can expand as rules change and is careful to maintain dual qualification of suppliers and chemistries so that products remain legal under either regime. While China is expanding its economy across the world, Korea exports its industrial model outward. It builds gigafactories inside the United States so that vehicles and storage projects can qualify for American credits and avoids tariff shocks (Financial Times, 2023). It stands up cathode and precursor plants near those factories so that content thresholds are met at the component level rather than only in final assembly. It seeds component clusters in Indonesia and Vietnam that are tuned to allied standards even when they draw on regional labor pools and logistics. It works inside trilateral frameworks with Japan and the United States that promise alignment in export controls, data sharing, and materials policy (CSIS, 2024). The diplomatic effect is to reproduce Korean norms and quality systems across the friend shored geography,

and the commercial effect is to keep Korean engineering central to the supply routes that are replacing the single center model of the previous era.

These five mechanisms operate together and reinforce one another. Technological intermediation ensures that factories across regions can swap information, parts, and warranties without friction. Alliance coordination ensures that new capacity is bankable and placed where the combination of public and private incentives will keep it in operation through full demand cycles. Upstream diversification ensures that a rising share of critical minerals can be certified for allied markets even if Chinese policies change or global prices spike. Regulatory traceability ensures that the same product can pass audits in multiple jurisdictions, turning legal complexity into predictable routine. Strategic ambiguity joined to regional reproduction ensures that the entire network has enough optionality to absorb shocks and enough common standards to remain globally scalable. The structure is not a return to a single center. It is a distributed arrangement in which a reliable middle power supplies the rules of operation, the methods of verification, the engineering that keeps throughput stable, and the finance that makes projects close (Brookings Institution, 2023). This is why South Korea matters to the durability of the present order. It is not the largest market for vehicles nor the owner of most of the ore, but it is the builder of the interfaces that let the U.S. and China still talk to each other under new constraints.

There are headwinds and they are real. Chinese producers have cost advantages in iron phosphate chemistries and a larger domestic market that keeps utilization high (Reuters, 2024). European demand has been uneven, and American cycles have pushed some factory schedules to the right. Graphite licensing has turned into a planning variable rather than a given. Yet those headwinds do not erase the structural position. Korea is moving up the value chain where it must and co-locating lower cost lines inside allied jurisdictions where it can. It is pairing high nickel recipes for high range vehicles with iron phosphate for storage and commercial fleets. It is qualifying alternative precursors and building cathode plants near American gigafactories so that more of the value add sits inside qualifying borders (KED Global, 2024). The pattern is an adaptive portfolio governed by rules and instruments that

Korea helps design. That is precisely what it means to be the middle power that manages bifurcation.

The consequence for the broader system is stability through design rather than through dominance. The U.S. can pursue selective decoupling without forcing an abrupt collapse in throughput because Korean firms make compliant routes real. China can maintain large scale processing and retain customers because Korean producers keep some channels open under documented and audited conditions. Allied countries in North America, Europe, and the Indo Pacific can build their own industrial bases without reinventing every layer because Korea exports the templates and trains the suppliers. The same logic applies to finance. Korean public lenders and pension pools do not replace private capital but redirect it into forms and time horizons that are consistent with policy. The effect is a global architecture in which hundreds of discrete decisions about plant siting, supplier approval, and contract law add up to a system that can absorb political shocks without breaking (Bloomberg, 2024). South Korea is the hidden author of many of those decisions, both through its own firms and through the rules that those firms carry into joint ventures.

Structural Context Across Three Periods

Dimension	21st Century: South Korea in U.S.-China Rivalry
Hegemonic Context	Fragmenting U.S.-led order challenged by China's industrial and technological rise. Rival architectures emerging around semiconductors, batteries, and data governance.
Core Challenge	Preserving interdependence while mitigating exposure to geopolitical risk; aligning efficiency with security and regulatory compliance.
Role of Middle Powers	πSouth Korea translates geopolitical rivalry into industrial systems by localizing production, financing diversification, and embedding regulatory trust.

4. Policy Recommendations

I forward five recommendations given South Korea's role as the key middle power in the world's battery economy. First, a U.S.-Korea Battery Standards and Traceability Accord should be jointly established by the Department of Energy (DOE) and Ministry of Trade, Industry and Energy (MOTIE) to harmonize technical rules, verification systems, and digital documentation underpinning the cross-border battery economy. DOE and the US Commerce's National Institute of Standards and Technology (NIST) would lead development of interoperable battery-passport architectures, including but not exclusive to serialization protocols, chemical-fingerprinting standards, and data-exchange formats, ensuring alignment with IRA tax-credit audits and U.S. warranty regimes. MOTIE, working alongside the Korean Agency for Technology and Standards (KATS) and the Korea Environmental Industry & Technology Institute (KEITI), would codify Korean traceability systems into a unified template that maps directly onto U.S. subsidy, origin, and ESG requirements. These two governments would create a permanent technical secretariat with joint engineering teams embedded in U.S. gigafactory regions, enabling real-time revision of test procedures, quality metrics, and audit documentation as chemistries and regulations evolve. Harmonization would substantially reduce compliance friction for gigafactories, automakers, and utilities operating across both jurisdictions while providing the U.S. with a trusted partner whose manufacturing systems already embed multilayer verification. For Korea, the Accord would institutionalize its role as the primary industrial interpreter of U.S. regulatory frameworks, ensuring bankability for Korean firms expanding in the U.S. Southeast and Midwest. Standardized documentation would also give federal agencies and Congress confidence that foreign-entity restrictions and ESG rules are verifiable at scale. By translating political directives into synchronized industrial routines, DOE and MOTIE would establish the backbone of a "trusted materials zone" that fortifies supply-chain bifurcation without disrupting global throughput.

A Joint Critical Minerals Investment Platform co-led by the U.S. Development Finance Corporation and the Export-Import Bank of Korea (KEXIM), supported by DOE's Loan Programs Office, U.S. EXIM, Korea Development Bank, and the National

Pension Service, would turn abstract supply-chain security goals into executable upstream and midstream investments. DFC would provide equity, catalytic capital, and political-risk mitigation for lithium, nickel, cobalt, manganese, and graphite projects in allied jurisdictions such as Australia, Canada, the U.S., and select Southeast Asian producers capable of meeting foreign-entity-of-concern rules. DOE's Loan Program Officer would extend long-tenor loans and credit support to U.S.-based refining, precursor, and cathode projects that align with gigafactory ramp-ups. On the Korean side, KEXIM and KDB would deliver export credits, project finance, and risk guarantees, while the National Pension Service would anchor projects with patient institutional capital. The platform would require dual qualification of all material flows, allowing minerals to serve both U.S. and Korean gigafactories and conform to evolving Inflation Reduction Act (IRA) and MOTIE rules. It would also standardize ESG, traceability, and procurement benchmarks across financiers, preventing fragmented due-diligence regimes that delay projects. By jointly steering capital into bottleneck segments, precursor plants, nickel intermediates, graphite processing, and recycling, the platform would scale alternative material routes without abruptly severing controlled connectivity to Asia. More importantly, DFC-KEXIM coordination would lock Korea's engineering and operational expertise into the heart of U.S. resource security strategy, transforming Korean firms into the preferred operators for compliant upstream assets. This makes the bifurcating system stable, investable, and globally scalable.

Third, a Trilateral Battery and Critical-Minerals Coordination Mechanism jointly led by the U.S. National Security Council, Korea's Office of National Security and MOTIE, and Japan's Ministry of Economy, Trade and Industry (METI) would institutionalize alignment across the world's three most advanced allied manufacturing systems. The NSC would integrate export-control decisions, foreign-entity classifications, and technology-security rules, ensuring that semiconductor and battery policies do not conflict across agencies. MOTIE and METI would harmonize industrial incentives, tax credits, rules governing active materials, and supplier-qualification frameworks, preventing divergent definitions of processing or value-added thresholds from splintering supply chains. DOE and Japanese research agencies would coordinate

joint programs in high-nickel cathodes, iron-phosphate lines, solid-state batteries, and recycling, while NIST, Korean Agency for Technology and Standards (KATS), and Japanese standards bodies align measurement and testing systems. The mechanism would also establish trilateral emergency-response protocols for disruptions in graphite, nickel matte, precursor chemicals, or processing capacity—coordinating stockpile releases, temporary waivers, and cross-licensing of qualified suppliers. By creating a shared regulatory and strategic language, the US NSC anchors Korea as the industrial interface connecting U.S. rulemaking and East Asian production ecosystems. The framework reduces regulatory arbitrage, simplifies corporate compliance, and expands the pool of suppliers, plants, and intermediate facilities that can operate legally across the trilateral bloc. This will, overtime, produce alignment that becomes a global reference model, pushing China to interact with a cohesive rule system rather than exploiting gaps between allies.

Fourth, the U.S. DOE and the NSC should partner with MOTIE and Korea's cabinet-level Resource Security Council to globalize Korea's advanced minerals-risk system into a joint early-warning architecture. Korea already operates one of the most sophisticated minerals-security regimes, complete with strategic-minerals lists, stockpiling targets, recycling mandates, and supplier-audit routines. A joint U.S.-Korea Early-Warning and Resilience Center would merge Korean plant-level data, upstream risk metrics, and traceability methods with U.S. trade intelligence, geospatial monitoring, and pricing analytics. Commerce and the Korean Institute of Geoscience and Mineral Resources (KIGAM) would manage shared databases detailing chokepoints across precursor chemicals, conversion capacity, renewable-grade graphite, and nickel intermediates. The NSC would integrate these insights into national-level crisis planning, enabling coordinated responses to export bans, sanctions shocks, natural disasters, or refinery outages. The Center would produce quarterly vulnerability dashboards, investment-risk maps, and cross-agency guidance for DFC, KEXIM, and KDB on where finance should be directed to close looming bottlenecks. It would also develop trilateral protocols with Japan for stockpile drawdowns, diversification sequencing, and synchronized supply-chain rerouting during crises. Korea's engineering-centric system would lend the U.S. a

granular, plant-floor perspective that federal agencies often lack, while the NSC ensures these insights shape policy in real time. This architecture prevents panic procurement, reduces price shocks, and turns mineral-security management into continuous governance rather than emergency reaction.

And finally, a Korean-led Global Battery Skills and Compliance Diffusion Initiative, co-organized by DOE, Commerce, USAID, MOTIE, KOTRA, and HRDK, would export the operational DNA of Korean battery manufacturing into the wider friend-shoring geography. Korean firms already excel at reproducing identical equipment families, process-control routines, and traceability systems across continents. MOTIE and DOE should jointly fund training centers in major battery hubs—including the U.S. Southeast and Midwest, Canada, Europe, Vietnam, the Philippines, and Indonesia—staffed by Korean engineers and compliance specialists. These centers would train suppliers in cathode and precursor quality control, ESG reporting, IRA-compliant documentation, safety testing, and lifecycle tracking. Commerce and the Korea Trade-Investment Promotion Agency would coordinate supplier recruitment while USAID supports capacity building in emerging hubs. Public agencies should also sponsor a shared low-cost digital stack for traceability and audit reporting that small and medium-size enterprises (SMEs) on both sides can adopt; DOE and MOTIE could require firms receiving DFC, EXIM, KEXIM, or KDB finance to integrate this system. The initiative would dramatically reduce compliance costs, expand the pool of qualified suppliers that can legally serve U.S. and Korean gigafactories, and solidify Korean standards as the default operating system of allied supply chains. As China scales its own global battery footprint, U.S. and Korean agencies would counter by exporting an interoperable, transparent, and audit-ready industrial model that aligns with democratic-market rules.

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VIII. Opportunities for US–ROK Cooperation on the Defense Industrial Base and Supply Chains

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1. Introduction

In recent years, ROK-US defense industrial base (DIB) cooperation has emerged in new forms and reached new heights. The war in Ukraine quickly revealed that Western munitions production was outstripped by demand, forcing the United States and North Atlantic Treaty Organization (NATO) to seek new sources. The ROK stepped up by triangulating the supply of 155mm artillery shells to the warzone via the United States. This was in part possible because of the 155mm shells the United States brought to South Korea in 1974 as part of its War Reserve Stocks for Allies (WRSA-K). Over the years, the United States reduced WRSA-K due to high operation costs, which the ROK acquired in 2008 and constantly maintained and upgraded for its own use. Essentially, the ROK was able to loan the older 155mm shells from these stocks back to the United States and use the profits to produce new shells for the ROK military. Not only was this efficient, but this was compatible with ROK national policy of not exporting lethal weapons to states directly engaged in warfare.

Meanwhile, ROK-US cooperation in ship building under the South Korean initiative named “MASGA (Make American Shipbuilding Great Again),” is poised to assist once again. The United States lags far behind China in building and maintaining warships to retain its maritime dominance in the Indo-Pacific. The ROK, the world’s leading ship building nation, has pledged to alleviate this predicament by offering its industrial strength to help build U.S. strategic capacity. Via MASGA, the ROK government has pledged to invest about \$150 billion USD in shipbuilding-cooperation. This will be used to upgrade U.S. shipyards with Korean ship-builders, including infrastructure investment, training American workers, and

co-production of vessels, as well as to enhance the maintenance, repair, and overhaul (MRO) of U.S. ships by Korean firms on U.S. soil.¹⁾

2. Threats and Deterrence

By its nature, a military alliance that pledges to supply weaponry, equipment, and other materiel in war time also includes a commitment from each country's defense industrial base in peace time. This industrial commitment consists of production and sustainment capacity, material inputs and the logistics needed to transport them, and the workforce to keep it all in motion. The U.S.-ROK alliance makes such a commitment and necessitates a manufacturing alliance in time of increasing threat of disruption and conflict. The U.S. and the ROK share many of the common threats stemming militarily from the DPRK and economically from the PRC. Pyongyang's evolving military posture is characterized by an expanding nuclear arsenal, frequent ballistic missile tests, sophisticated cyber operations, and a massive conventional force buttressed by asymmetric tactics. The DPRK threat to the ROK is immediate and comprehensive, ranging from the possibility of tactical nuclear strikes and artillery barrages to relentless cyberattacks. The threat to the United States is more strategic as the DPRK aims to constrain U.S. choices by holding American cities at risk and by threatening U.S. forces and allies abroad. Of late, the DPRK has restrained its military provocations for higher diplomatic gains.

Both Seoul and Washington are exposed to Chinese supply chain risks across critical sectors from semiconductors to rare earth minerals, pharmaceuticals, energy technologies, and finance. Beijing has shown a willingness to weaponize economic interdependence by leveraging its dominant position in key supply chains, using tactics such as export and import restrictions, informal boycotts, and market access pressures to coerce other nations.²⁾ The PRC's alternative economic development

1) Jung Min-kyung, PM says MASGA to be framework for advanced S. Korea-US partnership, The Korea Herald, August 19, 2025. As of October 26, 2025: https://www.koreaherald.com/article/10557101?utm_source=chatgpt.com.

2) Peter Hoskins, Laura Bicker, China tightens export rules for crucial rare earths, BBC News,

model poses challenges to countries operating under norms in market economies and international trade³⁾, discusses three challenges stemming from the PRC's threats to economic security, (1) the PRC's industrial policy, (2) commercial integration with the PRC's party-state apparatus; (3) and the PRC's ability and willingness to employ economic statecraft.

Confounding the threats posed by the DPRK and the PRC is the two countries' outright and alleged cooperation with countries with revisionist objectives to overturn the international order. Considering Russia leveraging North Korean materiel and personnel in its war of aggression against Ukraine, the ROK is now increasingly concerned with deepening Russian-DPRK cooperation. The highlighted presence of Russia and the DPRK at the 2025 Shanghai Cooperation Organization meeting and the 80th anniversary Victory-Day parade in Beijing, along with the presence of Iran's leadership, adds to the confluence of military cooperation between the so called "axis of upheaval" or CRINK. This grouping's alleged cooperation with Russia comprises an industrial component, which includes the sales of Iranian unmanned aerial systems, North Korean munitions, with alleged supply chain support from the PRC. Individually, the DPRK, Russia, or Iran may not be able to sustain a protracted conflict. Combined, however, their industrial capacity presents problems to any individual country, including the United States and the ROK. As Ukraine makes the case for Tomahawk missiles as Russian aggression continues, Ukraine's reliance on foreign military sales, raw material imports, and economic assistance from the United States and its European allies illustrates the interconnected nature of a defense industrial base and the complexity of supporting industrial capabilities.

If the United States and the ROK are to confront these military and economic challenges, they should look to bolster their industrial and supply chain cooperation

October 9, 2025. As of October 26, 2025: <https://www.bbc.com/news/articles/ckgzl0nwvd7o>.

3) Villalobos, Fabian, Trans-Atlantic Critical Mineral Supply Chain Cooperation: How to Secure Critical Minerals, Battery and Military Supply Chains in the European Theatre, *IAI Papers* 25|11 Rome, IAI, June 2025, 28 p. DOI: 978-88-9368-364-7. As of October 26, 2025: <https://www.iai.it/en/pubblicazioni/c03/trans-atlantic-critical-mineral-supply-chain-cooperation>.

in earnest. ⁴⁾ Doing so will not only produce greater combined industrial capacity, but it can also act as a deterrent against protracted conflict as wars are fought with materiel and logistics as much as firepower.

3. Common Challenges to Bolstering the Defense Industrial Base

The road to industrial cooperation is not a quick and easy endeavor. Ensuring production capacity for arms and equipment is available during contingency requires a host of capabilities that includes access to raw materials, a knowledgeable and ready workforce, the ability to rapidly integrate innovative technologies, and spare capacity at manufacturing facilities.

As demonstrated by the PRC's mounting sanctions on U.S. defense firms, ⁵⁾ cutting off access to raw materials and key components can delay the delivery of capabilities and mass needed by the warfighter. Such was the case when the PRC banned the export of lithium-ion batteries to the U.S. drone manufacturer Skydio, whose CEO posted a message to customers in which he complained that, "due to Chinese sanctions, battery supply would be limited for months as alternative sources to China were unlikely to be available for some time yet." ⁶⁾ One of the consumers of Skydio's products was Ukraine, meaning that delaying delivery of drones indirectly benefits the Russian military.

Even after a procurement contract is signed, it takes time to scale a workforce. Many skillsets and knowledge are required including design of systems and components, test and evaluate prototypes, build and optimize production equipment and processes, scale production capacity, operate equipment and tooling, acquire and

4) Kwon, Bo Ram. "US-South Korea Defense Industrial Cooperation: Drivers, Developments, and Tasks Ahead." Korea Policy. Vol 2. Issue 2. 2024. Korea Economic Institute of America.

5) Chavez, Leilani, China bans more US defense firms, DefenseNews, March 7, 2025. As of October 26, 2025: <https://www.defensenews.com/global/asia-pacific/2025/03/07/china-bans-more-us-defense-firms/>

6) Adam Bry, *China's Sanctions on Skydio*, in Skydio website, 30 October 2024, <https://www.skydio.com/blog/chinas-sanctions-on-skydio>.

manage feedstock, and ensure quality assurance. To establish these skills in the labor force requires recruitment which can have limitations related to background checks and willingness to relocate. After the workforce is recruited, operational and safety training takes time. Finally, once an employee begins working on the production line, that worker's position may be available only until a production number is met. Retaining the workforce is difficult when demand for weapons and equipment tends to be reliant on periods of crisis, creating boom and bust cycles. It is therefore difficult to build institutional knowledge that can train the next generation and teach them trade secrets and reduce the need for relearning old lessons.

Given the requirements needed by a joint force, onboarding innovative technology can run into barriers put in place for good reason. If a military service is interested in integrating a novel technology, it must cross-check with other organizations internally and across the services to ensure there are no duplicative efforts already underway. If none are found, then a requirement can be written that incentivizes adoption of a new technology. Military standards can restrict a program manager's ability to experiment with novel technology. Software solutions also run into issues getting access to the data needed to achieve their intended output due to cybersecurity concerns. Ensuring that a new firm is compliant with cybersecurity practices can take months and delay testing and evaluation of the technology. Even if prototypes deliver on their promise, economic concerns like unprofitable production numbers may prevent a start up from pursuing the military as a customer. This shapes a defense industry characterized by a small pool of firms, low competition, and disincentivized from innovating until a revolution in military affairs has already materialized. The need for militaries to standardize their sustainment and maintenance practices, processes, and related inventory of spare parts leads to the military procuring only one version of technology. So, even when new technology is adopted by the military, it is disincentivized to continue integrating new physical components. New components require more inventory. When current systems are upgraded with new components, the result is a fleet of mixed versions of the system with different operational needs, capability, and maintenance requirements.

These issues create an environment that is difficult to ensure spare capacity is available when crisis suddenly creates a spike in demand for war material. Without regular purchases of weaponry or equipment, production lines are often shuttered, staff sizes are reduced save for key individuals, and tailored tooling is placed into storage. The suppliers of the Original Equipment Manufacturers (OEMs) experience similar issues. As OEMs and suppliers wither away in capacity and capability, militaries face diminished manufacturing sources and material shortages (DMSMS). As DMSMS issues compile and compound, they can seriously delay the ability for production lines to come back online when demand does return.

US-ROK cooperation on the defense industrial base and supply chains could help address some of these challenges.

4. How Industrial Cooperation Strengthens the US-ROK Alliance

Jointly motivated by inequalities created by free trade and globalization, as well as the return of great power competition, large shifts in international partnerships and practices are calling into question the institutional foundations and basic assumptions of international cooperation – including in security and trade. Bringing the PRC into the World Trade Organization (WTO) in 2001 was once viewed as an opportunity to open China’s markets and reshape its heavily state-influenced economy, as well as a chance to groom China into a responsible leader. But decades later, both security and trade experts admit it was a strategic mistake.⁷⁾ China has indeed grown its military and economic power but its ambitions and trajectory towards “regional” primacy threatens the “global” standing of the United States. In addition, the relentless enhancement of the DPRK’s missile delivery systems complicate Washington’s strategic calculus as does the growing military and

7) Campbell, Kurt and Ely Ratner. “The China Reckoning.” *Foreign Affairs*. February 13, 2018.; Hillman, Jennifer A., “China’s Entry into the WTO—A Mistake by the United States?” (2022). *Georgetown Law Faculty Publications and Other Works*. 2448. <https://scholarship.law.georgetown.edu/facpub/2448>; Kine, Phelim, China joined rules-based trading system — then broke the rules, *Politico*, December 9, 2021. As of October 19, 2025: <https://www.politico.com/news/2021/12/09/china-wto-20-years-524050>.

industrial cooperation among the CRINK.

Given the rise of techno-economic and military competition between the United States and China and the “blocs” they command, U.S. policy makers must ask themselves what might the world look like in 10 to 20 years, what factors shape the ability of the United States and the ROK to strengthen industrial bonds, and in what direction might the two countries go to do so?

5. Positioning the US for a multi-polar future

The seeds for multi-polar blocs seem to be sprouting. In trade, competing multi-lateral trade agreements with the WTO have gained traction. Following the United States’ exit from the Trans-Pacific Partnership, the Japan-driven Comprehensive and Progressive Agreement for Trans-Pacific Partnership has slowly expanded its membership. The Biden Administration pushed a trade pillar within the Indo-Pacific Economic Framework for Prosperity (IPEF), but it ultimately failed to secure consensus. US-China competition in 2025 is further straining trade and could lead to multiple fragmented trade blocs and ecosystems. Indeed, a 2025 RAND report looked at potential options for the U.S. economy to remain competitive in the 2040 timeframe and included an economic-trade block as one such option to counter China.⁸⁾ Even supply chain securitization efforts have shown multi-polar trends through the creation and ongoing efforts of the Mineral Security Partnership (MSP), which seeks to advocate for high quality mining practices and to match mining projects with capital. South Korea’s position as the Chair of MSP allows for continued coordination between the two allies and with other like-minded countries.

The alignment of CRINK-nations speaks to their growing integration of military industrial capacity, technology, and personnel. North Korea reportedly has

8) Popper, Steven W, R. S Silbergliitt, Fabian Villalobos, Khrystyna Holynska, Krystyna Marcinek, Nadia Almasalkhi, Jack Lashendock, Rand Corporation. National Security Research Division, Rand Corporation, and United States. Defense Advanced Research Projects Agency. 2025. Build Thee More Stately Mansions Participatory Foresight and the Mid-Century U.S. Economy. Santa Monica, CA: RAND. <https://doi.org/10.7249/RR1947-2>.

transferred artillery shells, rockets, and even missiles.⁹⁾ The deployment of North Korean troops to Russia has the potential to enhance the DPRK's military capability by bringing back to the main fighting force lessons learned on modern military technology and tactics after decades of limited training. While Iran continues to deny its involvement in the Russian war of aggression against Ukraine, Iran's sales of one-way-attack drones like the Shahed-131 and Shahed-136 have provided the Russian military with a scalable solution to dwindling munitions and missile stockpiles. Though the PRC declared a "no-limits partnership" with Russia in a joint statement on February 4, 2022, it has officially maintained a stance of neutrality or balanced mediation. This diplomatic narrative is undermined by the PRC's imports of energy and agricultural products from Russia - thereby keeping afloat Russia's economy - and the PRC's exports of dual-use components needed in weapons systems¹⁰⁾ including fiber optic cables and lithium-ion batteries, both key components for military First Person View drones or unmanned aerial systems (UAS).¹¹⁾ Together, these relationships constitute a growing military block based on arms transfer, sharing military technology, industrial capacity, and energy.

The ROK is well positioned to be a great partner in a world with where multi-polar economic and military blocks are forming. Industrial capability and capacity are a locus of economic and military overlap where the US-ROK alliance can be leveraged for security in both domains.

9) Tianran Xu, North Korea's Lethal Aid to Russia: Current State and Outlook, 38 North, February 14, 2025. As of October 24, 2025: <https://www.38north.org/2025/02/north-koreas-lethal-aid-to-russia-current-state-and-outlook/>

10) Reuters, Exclusive: Chinese engines, shipped as 'cooling units', power Russian drones used in Ukraine, July 23, 2025. As of October 24, 2025: <https://www.reuters.com/business/aerospace-defense/chinese-engines-shipped-cooling-units-power-russian-drones-used-ukraine-2025-07-23/>.

11) Shepherd, C., Lu, R., Behind Russia's battlefield drone surge in Ukraine? Chinese factories, The Washington Post, October 13, 2025. As of October 24, 2025: <https://www.washingtonpost.com/world/2025/10/13/china-russia-drone-parts-ukraine/>.

6. Understanding Needs

To cooperate effectively, it is important that the United States and ROK each understand the other's strategic needs and political limitations. The United States' needs are in-part driven by the ongoing competition with China which has pressured the United States to maintain its both its military and economic primacy. To do so, the United States seeks to fully utilize alliances to maintain primacy and to shore up comprehensive capabilities to compete with China and win its strategic competition. The United States needs room to maneuver and therefore needs allies and partners to increase their military burden sharing. Maintaining and expanding a credible deterrent from military capability requires allies and partners to increase their interoperability with U.S. forces and systems. Sustained purchasing of U.S. weapons provides a demand signal to the U.S. DIB which bolsters its ability to produce materiel during crisis. Likewise, security of supply arrangements helps prioritize the U.S. DIB in securing material inputs. Increasing sustainment capabilities helps ensure the current capabilities and force structure are maintained.

Meanwhile, the ROK has its own national priorities that drive expectations from an its alliance with the United States. Pyongyang's military posture and ROK's economic dependencies on China place it in a difficult strategic position. To maintain its military deterrent, the ROK's smaller DIB requires more sophisticated cooperation on high-technology. To do so, the ROK is willing to become a hub for manufacturing collaboration and industrial cooperation. But its ability to maneuver within industrial alignment is somewhat limited. The ROK agrees that DIB integration amongst allies is needed to some degree. However, maintaining strategic autonomy also important since decoupling from China on all economic fronts in near impossible and against ROK's national interests.

The areas where overlapping priorities exist are those which should motivate further bi-lateral cooperation on the defense industrial bases and supply chains. The upstream, raw materials sectors compromised of critical minerals, the mid-stream, intermediate chemical and metal products, and the down-stream semiconductor and battery industries are examples of this overlap. The United States and the ROK can

develop and secure offtake for mining and processing within their two borders or alongside common partners. Developing critical minerals projects in foreign markets is often a difficult and long task. Local politics may drive countries in Africa or South America to be less open to cooperation with the United States. In those situations, the ROK often has a better reputation than United States that can be leveraged for strategic purposes.

7. Why US-ROK DIB and Supply Chain Cooperation Makes Sense

South Korea is making progress towards becoming a critical node in the U.S. defense industrial base and Indo-Pacific supplier network. As an ally with robust manufacturing capacity, advanced technology, and strategic location, Seoul can significantly bolster collective defense readiness and supply chain resilience. Comparing America's strategic competition against China today with that of Japan in the 1980s, strategists suggest increasing integration with allies like the ROK rather than reducing exposure and seeking self-reliance.¹²⁾

The ROK defense industrial base has excess capacity that can be mobilized in cooperation with the United States. In 2023, Seoul authorized the transfer of 500,000 rounds of 155mm artillery shells from its stockpiles to the United States, effectively making the ROK “a larger supplier of artillery ammunition to Ukraine than all European nations combined”.¹³⁾ This example underscores how integrating the ROK's production capacity can directly bolster allied warfighting.

Likewise, South Korea's military suppliers are available to augment allied capacity in energetics, autonomous systems and counter-UAS, maintenance and sustainment hubs, co-production partnerships across the region, supply chain resilience for

12) Carl Benedikt Frey, “How America Outcompeted Japan.” *Foreign Affairs*. October 1, 2025. <https://www.foreignaffairs.com/japan/how-america-outcompeted-japan>

13) Peter K. Lee and Lee Heesu. “Reciprocating Trust and Reconciling Ambitions in ROK-U.S. Defense Industrial Cooperation,” *Asan Policy Institute, Issue Brief*. May 28, 2024. As of October 26, 2025: https://asaninst.org/bbs/board.php?bo_table=s1_1_eng&wr_id=188&sfl=wr_subject%7C%7Cwr_content&stx=Trade+War&sop=and&page=1#:~:text=This%20has%20been%20reflected%20in,and%20potentially%20play%20a%20co

critical materials (e.g., forgings, castings, microelectronics), and software-enabled command-and-control integration. ¹⁴⁾ ROK defense companies like Hanwha are known for rapid response to crisis and sudden demand signals. Seoul's prompt delivery of K2 Black Panther tanks and K9 Thunder Howitzers to Poland, where first units were delivered only four months after contract, ¹⁵⁾ enabled NATO forces to respond swiftly to Russian aggression. Hanwha's K9s, now adopted by several U.S. allies, can be built in about 6 months. ¹⁶⁾ In addition to production capacity, such agility significantly enhances deterrent effects as it pertains to protracted warfare.

Lastly, South Korean defense exporters are more willing to localize their production than their European counterparts. The same can be said of the ROK's national champions in the civilian sector for batteries (LG Chemicals) and automobiles (Kia). Hence, the rapid expansion of ROK weapons exports is equivalent to creating a global defense industrial belt that can be mobilized during a contingency. This ensures that weapons production and logistics support continue under duress, which enhances deterrence.

8. Where does the ROK-US alliance go from ship building?

The 2023 US-ROK Security of Supply Arrangement (SOSA)¹⁷⁾ set the stage for public

14) Shinae Lee, Navigating the Opportunities and Challenges in NATO-South Korea Defense Industrial Cooperation, Sasakawa Peace Foundation. As of October 26, 2025: https://www.spf.org/iina/en/articles/lee_05.html#:~:text=The%20war%20in%20Ukraine%20calls,NATO%20countries%20have%20facilitated%20Ukraine%E2%80%99s

15) AP News, First delivery of S. Korean heavy weapons comes to Poland, December 6, 2022. As of October 26, 2025: <https://apnews.com/article/europe-business-poland-seoul-south-korea-6d7a06d58323ef77fd4ce3024110e0e8>

16) Matthew Loh, A South Korean weapons company once seen as a dinosaur is now churning out howitzers twice as fast as its Western competitors, Business Insider, June 7, 2024. As of October 26, 2025: <https://www.businessinsider.com/hanwha-aerospace-arms-manufacturing-howitzer-twice-fast-western-competitors-2024-6#:~:text=Korean%20Weapons%20Firm%20Once%20Seen,reported%2C%20estimating%20the%20company>

17) Department of Defense, DOD, Republic of Korea Ministry of National Defense Enter Into Security of Supply Arrangement, November 16, 2023. As of October 26, 2025: <https://www.war.gov/News/Releases/Release/Article/3591383/dod-republic-of-korea-ministry-of-national-defense-enter-into-security-of-supply/#:~:text=the%20.gov%20website.,DOD%2C%20Republic%20of%20Korea%20Ministry%20of%20National%20Defense%20Enter%20Into,the%20Defense%20Acquis>

and private sector cooperation in the defense industries of the two nations. The SOSA creates reciprocal industrial priority systems that allow the military department or ministry of one country to request priority supply of materiel from the partner nation. These agreements “encourage partner nations to acquire defense goods from each other, promote interoperability, and provide assurance of timely delivery during peacetime, emergency, and armed conflict.”¹⁸⁾ These arrangements are non-binding as they rely upon companies and suppliers to volunteer to be included in a pool of industry to respond to requests from the partner nation. The U.S. Defense Priorities and Allocations System works with the Department of Commerce to prioritize a partner nation’s request. Since 2023, the ROK has been creating a Code of Conduct for Korean firms to volunteer to do the same.

In 2024, the U.S. Department of War announced the Partnership for Indo-Pacific Industrial Resilience (PIPIR), “a multilateral forum of 14 Indo-Pacific and Euro-Atlantic partners collaborating to accelerate Indo-Pacific contributions to global defense industrial base resilience” to enhance collective defense capability and deterrence.¹⁹⁾ PIPIR has several functions including collaboration on technical, economic, and policy measures impacting the DIB. PIPIR allows for cooperation amongst industry, investors, and non-government stakeholders to build a network for co-production, co-sustainment, and supply chain integration. The current shipbuilding cooperation bolstering MRO aligns with these goals. At the 2025 Shangri-La Dialogue, Secretary Hegseth announced an effort to standardize small unmanned aerial systems (sUAS) across the Indo-Pacific region and “identifying secure sources of production for critical sUAS components”. Through seminars, surveys, and multilateral exercises, PIPIR seeks to identify barriers to industrial cooperation and policy reforms needed to do so. PIPIR seeks to expand the Regional Sustainment Framework, diversify supplier networks, and applying lessons from contemporary

ition%20Program%20Administration.

18) Department of Defense, Security of Supply, Assistant Secretary of Defense Industrial Base Policy website. As of October 26, 2025: <https://www.businessdefense.gov/security-of-supply.html>.

19) United States Department of War, FACT SHEET Partnership for Indo-Pacific Industrial Resilience (PIPIR), June 1 2025. As of October 25, 2025: <https://media.defense.gov/2025/Jun/02/2003730341/-1/-1/1/FACT-SHEET-PARTNERSHIP-FOR-INDO-PACIFIC-INDUSTRIAL-RESILIENCE.PDF>.

crisis and conflict to bolster supply chain robustness and allied interoperability, thereby accelerating defense industrial collaboration across the Indo-Pacific.

These frameworks allow for broader defense industrial base and supply chain cooperation between the two countries up and down the “value chain” which can be roughly binned into 3 categories: end products, midstream intermediate products, and raw materials.

End products include munitions, missile systems, drones, or ground vehicles. The United States has shown a willingness to expand its military production capabilities by signing an AMRAAM co-production with the Government of Japan. Cooperation on production of end products is important because increasing demand for final product increases demand for entire value chain of components and raw materials and the workforce needed to maintain those production capabilities and capacity. Because both countries have modern defense industries, the United States and ROK could work together to bolster foreign military sales.

Mid-stream products include processed chemicals and metal feedstock that are used to make more complex components. However, the production of mid-stream products is often dominated by Chinese firms which include state-owned enterprises. Few non-Chinese alternatives exist in these industries, meaning that investment in new or existing firms is needed to ensure competition in the market.

Raw materials include mineral ores, mineral salts, concentrates, and semi-processed goods. Collectively, the raw materials derived from mineral resources have been termed critical minerals and materials. They are characterized by their geographic, geologic, and industry constraints - often in relation to Chinese ownership, monopoly or monopsony pricing strategies, and support from industrial policy measures.

The many tiers of mineral-technology values chain mean there are many opportunities for industrial cooperation to bolster the defense industrial base and secure supply chains for both countries.

9. Opportunities for Cooperation

Opportunities below are taken from a 2025 trilateral cooperation supply chain study by Villalobos et al.²⁰⁾ They are organized by the same categories in the study – policy objectives for securing supply chains by leveraging allies and partners.

1) Reducing Barriers to Foreign Investment, Trade, Specialized Labor, and Knowledge Transfer

Despite unpredictability in U.S. trade policy, several experts see potential in sectoral trade agreements, “buyer’s clubs,” and cooperative purchasing arrangements to secure materials like critical minerals and to bolster the semiconductor and battery sectors. The United States’ partial tariff exemptions for critical minerals and its 2025 Section 232 investigation suggest space to include supply chain considerations within trade talks with South Korea.

South Korea has already acted to mitigate the impact of Chinese industrial policy on its economy (e.g., by placing antidumping duties on Chinese steel) and could initiate discussions the United States on countering artificially low-priced Chinese exports for other sectors as well. This could include the use of tariffs, investment rules, and science and technology agreements. Reacting to any trade measure takes time even if the impact to businesses is immediate. Therefore, phased roll out of tariffs over a multi-year timeline with detailed rules of origin would allow for Korean and U.S. industry to adapt to changing economic incentives. Bilateral discussions could also reach into multilateral fora with like-minded countries (e.g., MSP, IPEF, Chip 4 Alliance, G7, and arbitration bodies). There is potential for bringing in partners like the G7, whose members have signaled support for cooperation on CMSCs.²¹⁾

20) Villalobos, Fabian, Zohan Hasan Tariq, Anujin Nergui, Elisa Yoshiara, Jinyoung Lee, Mina Pollmann, Harriet Goers, et al. 2025. Securing South Korea’s Critical Minerals Supply Chains Through Trilateral Cooperation Analysis and Tools for Supply Chain Net Assessment, Supply Chain Cooperation, and Economic Security. Santa Monica, CA: RAND. <https://doi.org/10.7249/RR4000-1>.

21) Japan’s Finance Minister, Katsunobu Kato, called for “G7 nations to unite and respond” to China’s October 8, 2025 export controls on rare earths and battery materials and manufacturin

Trade agreements bolstering defense industrial base and supply chain cooperation should include tax incentives for firms meeting traceability standards to distinguish ethically sourced minerals from those linked to Chinese practices violating environmental or human rights standards. The two countries could implement import quotas favoring compliant materials, stimulating demand for non-Chinese supplies.

To maximize domestic capabilities, the partners must facilitate mobility for skilled professionals to allow faster exchange of specialized knowledge. The mass raid of Korean nationals working at the Hyundai Motor Group battery-plant construction site in Georgia exemplified tensions between investment, labor, and the bilateral promises made by the ROK and U.S. government. Among the 300 Korean nationals detained by the U.S. Immigration and Customs Enforcement in September 2025, the majority had come to work on B-1 business-visitor visas or via the ESTA visa-waiver programme.²²⁾ While the U.S. authorities argued their work violated the terms of their visas, the Korean firms made the case that they were lawfully working to meet a hard construction deadline. That is, with the lack of eligible U.S. workers with the appropriate skillsets and willingness to work overtime, there was not much choice but to fly in the Korean workers that would finish the job using visa options readily available. The Georgia incident has accelerated ROK-US government consultations on clarifying the terms of the required visas and alleviating tensions between investment and labor, which ultimately needs to be ironed out to support U.S. national strategic priorities.

g equipment. See Yokoyama, Erica, Japan's Kato calls for G7 unity over China's rare earth curbs, *The Japan Times*, October 16, 2025. As of October 25, 2025: <https://www.japantimes.co.jp/business/2025/10/16/economy/japan-finance-minister-china-rare-earth/>. On June 17, 2025, the G7 adopted a five-point plan for critical mineral security. See G7 CRITICAL MINERALS ACTION PLAN, Government of Canada, June 17, 2025. As of October 25, 2025: <https://www.mofa.go.jp/files/100862251.pdf>.

22) Park Young-Woo, U.S. detains over 30 Korean workers tied to Hyundai-LG battery facility in Georgia, *Korea JoongAng Daily*, September 5, 2025. As of October 26, 2025: https://koreajoongangdaily.joins.com/news/2025-09-05/business/industry/More-than-30-Korean-employees-detained-during-US-immigration-raid/2392437?utm_source=chatgpt.com.

2) Reducing Barriers to Data and Intelligence Sharing

Knowledge of industrial vulnerabilities and risk to supply disruption underpins crisis management. South Korea, Japan, and the United States' share information on shipping container and port infrastructure information that could potentially disrupt supply chains via the trilateral Early Warning System (EWS). This EWS could be expanded to include further information on defense logistics in the Indo-Pacific. Within IPEF is an underutilized crisis response network that could be developed further as well. Bilateral cooperation on designing new trade codes could accelerate and improve supply chain risk monitoring capabilities of both countries.

Existing security-related intelligence sharing, such as the General Security of Military Information Agreement (GSOMIA) of 2016, could broaden to cover economic security and supply chain threats. Previously, cybergroups linked to China have targeted critical mineral mining companies for information operations and cyber operations to extract sensitive data.²³⁾ The imposition of restrictions on companies exporting critical minerals and materials or related manufacturing equipment has also caused concern for data collection of sensitive proprietary and customer data.²⁴⁾ Such cooperation could be consolidated into a broader defense industry information sharing agreements.

In the future, cooperation could include tracking North Korean, Russian, Iranian, and Chinese exports that may threaten international peace. Tracking and sharing data on these activities could help counter the growing industrial capacity of the "Axis of Upheaval". It may also foster opportunities to cooperate on targeting specific assets and take the initiative during times of crisis through the use of offensive cyber and information operations against adversarial industrial capacity. Because ROK

23) Villalobos, Fabian, Jonathan L. Brosmer, Richard Silbergliitt, Justin M. Lee, and Aimee E. Curtright. Time for Resilient Critical Material Supply Chain Policies, RAND Corporation, RR-A2102-1, 2022. As of March 7, 2025: https://www.rand.org/pubs/research_reports/RR-A2102-1.html.

24) Villalobos, Fabian, Zohan Hasan Tariq, Anujin Nergui, Elisa Yoshiara, Jinyoung Lee, Mina Pollmann, Harriet Goers, et al. 2025. Securing South Korea's Critical Minerals Supply Chains Through Trilateral Cooperation Analysis and Tools for Supply Chain Net Assessment, Supply Chain Cooperation, and Economic Security. Santa Monica, CA: RAND. <https://doi.org/10.7249/RR-A4000-1>.

companies have operations inside the PRC, their business intelligence might be useful in this capacity.

3) Creating Shared Crisis Management Mechanisms

While each country maintains strategic material stockpiles of raw and intermediate materials for both civil and defense needs, the concept of joint stockpiling between countries has yet to be fully explored. Such cooperation would require agreements on contributions, funding, prioritization, and release protocols — potentially modeled on currency swap deals like the renewed South Korea-Japan agreement in 2023.

The United States published its Supply Chain Risk Management (SCRM) guidebook in June 2024²⁵⁾ which the ROK can use to benchmark its “8-step” best practices to mitigate risk in the defense supply chain.²⁶⁾ Likewise, the United States can learn from ROK legislation aimed enhancing supply chain securitization efforts.²⁷⁾

Other mechanisms could involve support packages for defense firms facing Chinese coercion, inspired the multi-lateral measures taken against China’s aggression towards Lithuania and Micron, where affected industries received coordinated investment backing from allied nations. The two countries can implement lessons learned from these experiences and standardize protocols to follow in the future.

25) Department of Defense, DoD Supply Chain Risk Management Guidebook Roles, Best Practices, and Strategies, June 9, 2025. As of October 26, 2025: https://www.dau.edu/sites/default/files/2025-06/DoD%20SCRM%20Guidebook%20FINAL%20V1.0_06_24_2025.pdf

26) 선미선. 국방 공급망 회복탄력성 강화 전략 제언: 국내외 위험관리 동향 분석과 우리 군 도입 방안을 중심으로 국방논단. 2025. 9. 22. 한국국방연구원. (this KIDA publication is in Korean only)

27) This includes Act on Special Measures for Strengthening the Competitiveness of, and Protecting National High-Tech Strategic Industries (February 3, 2022); Act on Special Measures to Strengthen Competitiveness and Stabilize Supply Chain of Materials, Components, and Equipment Industry (May 25, 2023); Framework Act on Supply Chain Stabilization Support for Economic Security (December 8, 2023); and Special Act on National Resource Security (January 9, 2024). For more see Villalobos et al, 2025, Chapter 3, p29.

4) Pooling and Targeting Resources Outside the Bilateral

When access to foreign resources is needed, foreign development projects can be used strategically to counter China's Belt and Road Initiative while securing supply chains — as shown by the Lobito Atlantic Railway which supports transportation of critical mineral exports from Central Africa to the Angolan coast. Similar ventures in resource-rich but infrastructure-poor countries (e.g., India, Mongolia, Vietnam, Philippines, Malaysia) could be financed through joint work among U.S. Development Finance Corporation, U.S. Export Import Bank, and Export Import Bank of Korea. The U.S. Trade Development Agency can support cross-country exchange of industry to support small and medium enterprises entering the defense industry.

The MSP platform could improve collaboration among public and private investors, with the ideal being aligned efforts from Korean and U.S. financial agencies. Notably, some developing countries prefer working with Korea rather than directly with the United States, making them valuable intermediaries for project engagement.

Outside the bilateral relationship there are additional opportunities for ROK and United States to bolster DIB and supply chain cooperation. Japan, the United Kingdom, and Italy are coordinating development on next generation aircraft through the Global Combat Air Programme (GCAP). Engaging with the GCAP could present opportunities for U.S. and South Korean defense suppliers to find new markets and build a more diverse and resilient customer base.

The trilateral security partnership between Australia, the United Kingdom, and the United States (AUKUS), is under renewal and revision following the announcement of US-Australian cooperation on critical minerals for commercial and defense industries.²⁸⁾ Pillar 2 of the original AUKUS agreement contained language on cooperation on the broader defense industrial base and the ability for third party

28) The White House, United States-Australia Framework For Securing of Supply in the Mining and Processing of Critical Minerals and Rare Earths, October 20, 2025. As of October 25, 2025: <https://www.whitehouse.gov/briefings-statements/2025/10/united-states-australia-framework-for-securing-of-supply-in-the-mining-and-processing-of-critical-minerals-and-rare-earths/>.

countries to participate. This might be an opportunity for South Korean defense industry to become involved to bolster the Australian DIB by localizing investments.

The US-Japan Defense Industrial Cooperation, Acquisition, and Sustainment Forum has been used in the past to support feasibility studies on DIB cooperation. The announcement of co-production of AIM-120 (AMRAAM) missiles²⁹⁾ by Secretary Hegseth was one such output of the Forum. Engagement between the Japanese and South Korean defense industries could support co-production efforts by matching potential suppliers and customers.

5) Providing Expertise to Improve Capability and Capacity in Partner Nations

Developed countries can assist developing nations in establishing stronger institutions around mining governance, integrating technology, and adopting regulations favorable to foreign direct investment, thereby creating a more predictable environment for multinational corporate investment and countering Chinese exploitation of regulatory gaps. The U.S. Commercial Law Development Program is one such agency to support this effort in coordination with a South Korean partner equivalent.

Cooperation between the United States and ROK could cover unconventional mineral sources such as recycling and deep-sea mining. With both Japan and South Korea active in seabed mining research and the United States supporting industry development, trilateral collaboration could set global standards and foster alternative supply chains free from Chinese control.

6) Increasing Market Access and Protecting Foreign Investments

Opening new markets and safeguarding existing investments in the defense industry and supply chains of strategic interest will require a careful balance of strategic planning, diplomatic engagement, alternative financing, and trade policies.

29) Kyodo News, Japan, U.S. agree to urgently boost deterrence amid assertive China, March 30, 2025. As of October 25, 2025: <https://english.kyodonews.net/articles/-/53213>.

Foreign military sales present opportunities to link military cooperation with supply chain security to bolster the demand signal for important production lines of weaponry and equipment. For instance, by targeting offset investments into local mines, smelters, or small and medium enterprises coupled with guaranteed offtake agreements from local suppliers in exchange for increased purchases of military equipment.

10. Conclusion

Growing concerns in the military and economic domains are leading to a more competitive and fragmented multi-polar world. As the United States and ROK assess their enduring alliance, they should ensure that the upgraded ROK-US alliance reflects the fact the military alliances are inherently industrial in their nature. Both South Korea and the United States could bolster their efforts to deter military and economic risks through cooperation on the defense industrial base and supply chains. By leveraging each other's capacity and capability, the two countries can enhance their industrial readiness by addressing the common challenges to sustaining strategic industrial capacity. With industrial capacity in place and deterring adversaries, each country is better suited to support and pursue its strategic priorities in the Indo-Pacific region.

Abbreviations

AMRAAM	AIM-120 Advanced Medium-Range Air-to-Air Missile
AUKUS	Australia, United Kingdom, United States trilateral partnership
CMSC	critical minerals supply chain
CRINK	China, Russia, Iran, North Korea
DIB	Defense industrial base
DMSMS	Diminished manufacturing sources and material shortages
DoD/W	U.S. Department of Defense/War
DPRK	Democratic Republic of Korea
DRC	Democratic Republic of the Congo
EWS	Early Warning System
GCAP	Global Combat Air Programme
GSOMIA	General Security of Military Information Agreement
IPEF	Indo-Pacific Economic Framework for Prosperity
MASGA	Make American Shipbuilding Great Again
MSP	Minerals Security Partnership
OEM	Original Equipment Manufacturer
PIPIR	Partnership for Indo-Pacific Industrial Resilience
PRC	People's Republic of China
ROK	Republic of Korea
SOSA	Security of Supply Arrangement
UAS	Unmanned Aerial System
WRSA-K	War Reserve Stocks for Allies-Korea
WTO	World Trade Organization

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IX. Enabling MASGA: An Overview and Comparison of Policy Options that Strengthen the U.S.-ROK Alliance through Naval-Industrial Cooperation

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1. Definition of Key Concepts and Analysis of Existing Research

Industrial capacity as a determinant of national power

Shipbuilding cooperation is at its core a push to rebuild industrial capacity to enhance national power. National power in the context of international relations can be defined as the ability of a state to utilize its means and resources to serve national objectives.¹⁾ Hans Morgenthau stressed the need to apply metrics as an instrument.²⁾ Industrial capacity is one of many instruments for a state to exercise its national power. Despite the clear limitations of assessing national power through a single element, industrial capacity deserves renewed attention. The U.S. faces a monumental task of revitalizing its industrial base due to the convergence of global and domestic trends. Externally, strategic competition with the People's Republic of China (PRC, China) has sparked a push to reduce dependencies on adversaries in anticipation of potential sustained conflicts. Internally, a disenfranchised manufacturing workforce has become increasingly skeptical of globalization, pressuring decision-makers to reassess current economic structures based on offshoring. In the context of these developments, shipbuilding becomes an area in which Washington seeks to re-establish an industrial footprint and enhance its competitiveness.

Converging economic security interests in the U.S.-ROK alliance

1) David Jablonsky, "National Power," *Parameters* 27, no. 1 (1997), doi:10.55540/0031-1723.1815

2) Hans J. Morgenthau, *Politics among Nations : The Struggle for Power and Peace*. 5th ed., rev. New York: Knopf, 1978.

Shipbuilding cooperation between the ROK and the U.S. reflects greater alignment between the two countries on economic security. This study describes economic security as “The protection of a nation and its economy from various threats.” Both the U.S. and ROK converge in their placement of economic security under national strategy, likely shaped by recent experiences with China.³⁾ For the U.S., acquiring shipbuilding knowledge and building a new maritime-industrial base reduces supply chain vulnerabilities. For the ROK, access to the U.S. market strengthens its competitiveness in shipbuilding. Enhancing economic security through industrial capacity-building is thereby a means of promoting national security for both countries.

Technological innovation as a determinant of national power and enabler of economic security

In the modern era, a competitive technological edge and innovation capabilities are critical to power.⁴⁾ Industries based on such technologies enhance a nation's economic security. The proliferation of emerging technologies such as artificial intelligence disrupts existing industries and economies.⁵⁾ As such, discussions around economic security and national power must include a technology and innovation angle to remain relevant. The inherent dual-purpose characteristics of the shipbuilding industry necessitate the addition of a defense industrial perspective. Horowitz and Pindyck define military innovations as changes in the conduct of warfare designed to increase the ability of a military to generate power.⁶⁾ They also delineate a process of invention, incubation, and implementation.⁷⁾ In addition, Tai Ming Cheung defines defense innovation as “the transformation of ideas and

3) Emily Benson and Catharine Mouradian, “How Do the United States and Its Partners Approach Economic Security?” *Center for Strategic & International Studies*, November 08, 2023. <https://www.csis.org/analysis/how-do-united-states-and-its-partners-approach-economic-security>

4) James Manyika et al, “Innovation and National Security: Keeping Our Edge,” (New York: Council on Foreign Relations, Task Force Report No.77, 2019), 10.

5) Manikya et al, 13.

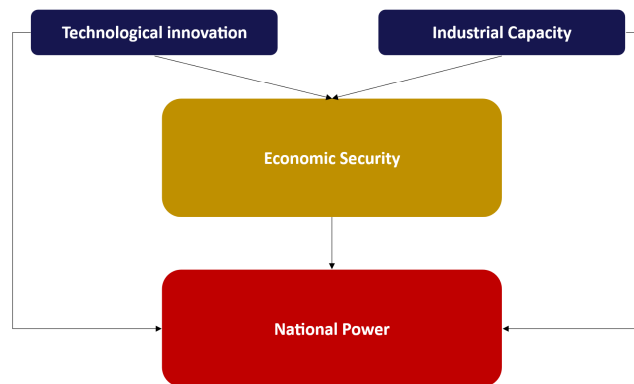
6) Horowitz and Pindyck, “What Is a Military Innovation and Why It Matters,” 99.

7) Horowitz and Pindyck, “What Is a Military Innovation and Why It Matters,” 87.

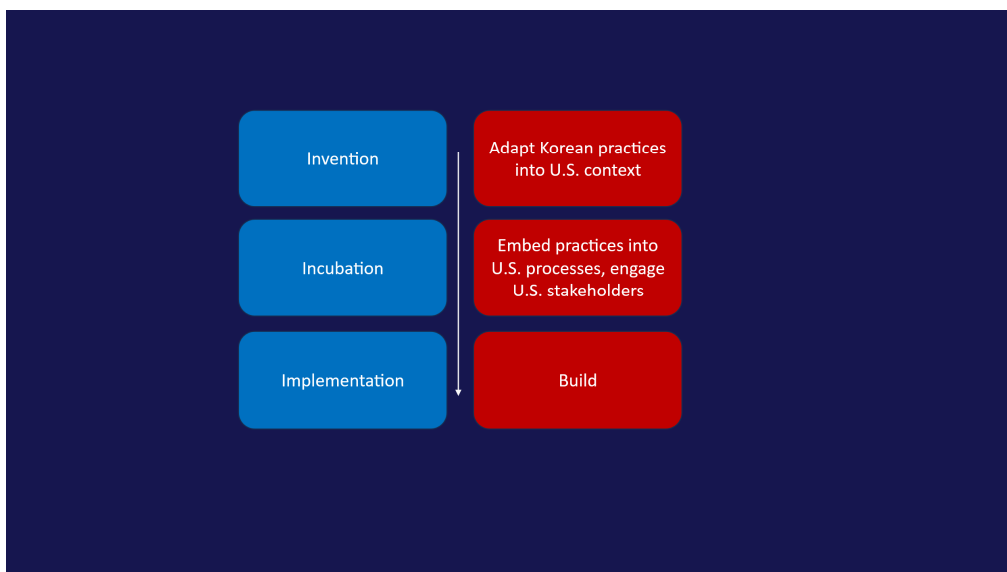
knowledge into new or improved products, processes, and services for military and dual-use applications.⁸⁾ Using these definitions, the paper positions shipbuilding cooperation as an example of defense innovation defined by Cheung that utilizes the process of innovation prescribed by Horowitz and Pindyck. Due to the distinction between defense and military innovation, the paper refers to the cooperation between the ROK and United States as “maritime-industrial” to include the commercial side, rather than “naval-industrial.”

Using this broader framework, we can develop a hypothetical maritime industrial collaboration between the United States and the ROK. Invention, or the creation of new tactics and technologies, is the creation of shipbuilding technology and shipyard operational know-how. If defining invention as *applying* these technologies and tactics to U.S. shipyards, the step is not complete. If the outcome as a “revitalization” of the American shipbuilding industry, the second interpretation is suitable. The second step, incubation, is the process of entrenching the ROK’s operational model and technology in American shipyards and among U.S. shipbuilders through advocacy and education movements. This too is under way. Finally, implementation is the process of fostering political will within the United States to lead communities of interest (i.e., shipbuilding interest groups) to adopt ROK tactics and technologies.

8) Tai Ming Cheung, “A Conceptual Framework of Defence Innovation,” *Journal of Strategic Studies* 44, no. 6 (2021): 778.



Framework for understanding shipbuilding as a means to boost national power.



Process of innovation derived from Horowitz and Pindyck's model applied to shipbuilding.

3. Contextual Background

Naval vs commercial shipbuilding

Commercial and naval shipbuilding share some base infrastructure and labor

requirements, but naval vessels are smaller and more complex than commercial vessels.⁹⁾ Military ships such as submarines often require a different industrial base, allowing for little room for transferability. This is due to the additional requirements of military vessels, including specialized equipment, durable hulls, and longer operability times at sea.¹⁰⁾ The larger size requirements for commercial vessels often mean that limited numbers of shipyards in a country can construct them. Meanwhile, the complex design of most naval vessels mean that their construction is a far more expensive procedure. In addition, as most customers of naval vessels are national governments, the contracting process tends to have more regulatory hurdles and subsequent delays that deter otherwise capable shipbuilders.¹¹⁾ The need to adapt to new trends in warfare often mean that naval contracts often include substantial revisions and reviews of a single contract, including design revisions.¹²⁾ Naval auxiliary vessels are structurally closer to commercial vessels than they are to naval warships in an “in-between” category. Finally, the shipbuilding industry is adopting new automation methods and other robotic systems that enhance labor efficiency.¹³⁾

The decline of the American shipbuilding industry

Today, the U.S. occupies less than one percent of global shipbuilding output, with most remaining ship production for the military, with foreign shipbuilders dwarfing American production. Just four public naval shipyards operate along with a handful of private shipyards. These shipyards are largely at capacity and can't afford further expansions, making the Navy's original target production goals ranging from 348 to 381 manned battle force vessels unlikely.¹⁴⁾

9) John Birkler et al., *Differences Between Military and Commercial Shipbuilding: Implications for the United Kingdom's Ministry of Defence* (Santa Monica, CA: RAND Corporation, 2005), 28. https://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG236.pdf

10) Kirchberger, “Assessing China's Naval Power,” 140.

11) Birkler et al, 29.

12) Birkler et al, 33.

13) Chris Lo, “The digital shipyard: robotics in shipbuilding,” *Ship Technology*, August 26, 2013. <https://www.ship-technology.com/features/feature-the-digital-shipyard-robotics-shipbuilding/?cf-view>

The rise of South Korea and its strategic significance

South Korea has integrated shipbuilding complexes centered around large clusters, such as the Ulsan, Okpo and Geoje shipyards. These shipyards have designated sections for naval and commercial shipbuilding, with each section sharing some industrial infrastructure but maintaining separate workflows, sensitive facilities and personnel.¹⁵⁾ Despite these strong advantages, the ROK's shipbuilding industry also faces challenges, especially a small domestic demand that is incapable of functioning as a "safety valve" during global order shortages, leaving the country susceptible to external influence.¹⁶⁾ The ROK is faced with not just a critical opportunity, but a *necessity* to foster a long-lasting partnership with Washington. Shipbuilding is one such node of cooperation notable in that when compared to both the U.S. itself and other allies, the ROK holds a disproportionate advantage in and should leverage.

Existing barriers to cooperation

Bilateral maritime-industrial cooperation between the United States and ROK covers both commercial shipbuilding and naval shipbuilding. Cooperation would then consist of South Korean shipbuilders working with the USN in limited capacity, or revitalizing private shipyards and America's maritime-industrial base, which is more inclusive in definition than the naval-industrial sector. Both scenarios carry legal and economic challenges.

The most significant legal challenge on the commercial side is that of the Merchant Marine Act of 1920, otherwise known as the Jones Act. The cabotage law mandates that all goods transported between two U.S. ports must be carried on vessels that are U.S. built, owned, crewed, and flagged.¹⁷⁾ For just over a century, the Jones Act

14) Brian T. Di Mascio, "Foreign Shipyards Can Help the U.S. Navy Build Its Fleet," *U.S. Naval Institute*, Accessed December 09, 2024. <https://www.usni.org/magazines/proceedings/2024/october/foreign-shipyards-can-help-us-navy-build-its-fleet>

15) John Birkler et al, "Differences Between Military and Commercial Shipbuilding: Implications for the United Kingdom's Ministry of Defence," RAND Europe, 89, 2025.

16) Soo Kee Tan, "Race in the Shipbuilding Industry: Cases of South Korea, Japan and China," 79.

has protected what its proponents identify as key American interests. But in the 1900s, there was a clear incentive to maintain a strong American fleet in case conflict in Europe would disrupt America's ability to supply domestic and allied militaries and economies. Currently, the Jones Act prohibits foreign-built ships owned by a U.S. person from trading between U.S. ports. Its requirements for crew and ownership amid a declining labor force complicate long-term investments in U.S. shipyards. Meanwhile, lower costs of Chinese shipyards incentivize U.S. shipowners to pay the penalties outlined in the Jones Act and buy Chinese products anyways.¹⁸⁾

Another challenge on the military front is the DOD Appropriations Act of 1968. Two amendments to the Act, 14 U.S.C. 1151, and 10 U.S.C. 8679, are of particular concern. The former, known as the Tollefson Agreement, prevents funds from being used to construct major components of ship hulls in foreign shipyards.¹⁹⁾ The latter, or the Byrnes Amendment, prevents funds from being used to construct naval vessels in foreign shipyards. The two amendments together greatly limit the degree of maneuverability potential foreign partners would have in contracting for the United States, unless the company explicitly establishes a subsidiary based in the United States. As with the Jones Act, the Byrnes-Tollefson Agreement was designed to prevent the national naval industrial base from falling to foreign competition, it now arguably hinders naval-industrial cooperation with foreign partners.

With a plethora of regulatory hurdles in building ships for America, some have looked to take small steps by working on the maintenance, overhaul, and repair (MRO) of U.S. vessels. While this is an area worth exploring in the commercial side, 10 U.S.C. § 8680 remains an obstacle to furthering cooperation. This legal restriction prevents significant naval repair or refurbishment work from being done on U.S. home-ported naval vessels with limited exceptions.²⁰⁾

17) William Olney, "Cabotage sabotage? The curious case of the Jones Act," *Journal of International Economics* 127 (2020).

18) "Introduction of Merchant Marine Allies Partnership Act," *Congressman Ed Case Hawaii District 1*, August 01, 2025. <https://case.house.gov/news/documentsingle.aspx?DocumentID=4724>

19) Colin Grabow, "The Self-Imposed Blockade: Evaluating the Impact of Buy American Laws on U.S. National Security," CATO Institute, August 16, 2022. <https://www.cato.org/policy-analysis/self-imposed-blockade>

In recent years, efforts have been made to address these legal hurdles and facilitate bilateral shipbuilding cooperation. The SHIPS for America Act contains provisions for financial incentives such as lowering existing U.S. cost penalties for foreign partners.²¹⁾ The Ensuring Naval Readiness Act would revise the provisions of the Byrnes-Tollefson amendments to allow shipyards in authorized foreign partner countries to construct or repair U.S. naval vessels.²²⁾ The third, the Merchant Marine Allies Partnership Act, would lift the Jones Act restriction requiring domestic construction of U.S. flagged vessels to engage in domestic port commerce.²³⁾ The second and third proposals would facilitate full-scale ROK-U.S. shipbuilding cooperation, while the first provides additional support through various subsidies, similar to the cases of the semiconductor and electric vehicle industries through the CHIPS Act and Inflation Reduction Acts. However, none of the three proposals have passed Congress, and remain in limbo.²⁴⁾

An overview of major regulatory barriers in the U.S. pertaining to shipbuilding.

Name	Affects	Proposed Solution
Merchant Marine Act	Cabotage	Merchant Marine Allies Partnership Act
Byrnes-Tollefson Amendments	Hull and Ship Construction	Ensuring Naval Readiness Act
USC 8680	MROs	N/A
N/A	Subsidies	SHIPS Act

20) "10 USC 8680: Overhaul, repair, etc. of vessels in foreign shipyards: restrictions," *Office of the Law Revision Counsel, United States Code*, Accessed September 15, 2025. <https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title10-section8680&num=0&edition=prelim>

21) "Garamendi, Kelly, Senators Young and Kelly, Introduce SHIPS for America Act to Revitalize US Shipbuilding and Commercial Maritime Industries," *U.S. Congressman John Garamendi*, December 19, 2024. <https://garamendi.house.gov/media/press-releases/garamendi-kelly-senators-young-and-kelly-introduce-ships-america-act>

22) "Ensuring Naval Readiness Act," *Mike Lee, US Senator for Utah*, May 2024. <https://www.lee.senate.gov/services/files/E19F4B58-519C-4035-A717-10B188162F82>

23) "Introduction of Merchant Marine Allies Partnership Act," *Congressman Ed Casegr*. <https://case.house.gov/news/documentsingle.aspx?DocumentID=4724>

24) Hyo-Seong Kim, "MASGA' dead in the water? Essential regulatory changes languish in committee," *Korea JoongAng Daily*, August 11, 2025. <https://koreajoongangdaily.joins.com/news/2025-08-11/business/industry/MASGA-dead-in-the-water-Essential-regulatory-changes-languish-in-committee/2373184>

Due to the political nature and historic background behind these barriers, there is a strong possibility that they will be upheld. Strong interest groups from the shipbuilding industry will likely lobby to block appeals. Therefore, rather than proposing solutions seeking to address the regulations themselves, it is more valuable to examine the strategies that ROK shipbuilders can take independently of existing U.S. laws. As such, the study identifies the main methods of maritime-industrial cooperation under the assumption that the underlying set of legal, political regulations will remain intact, focusing instead on the outstanding areas in which South Korean shipbuilders can navigate America's shipbuilding industry and position itself to be the prime beneficiary if and when in the future, these legal and political regulations are revisited.

4. Options/Recommendations

The background introduced above raises the urgency of the question, "how can maritime industrial cooperation be realized?" By entrenching themselves as a trusted and critical partner, the ROK can increase gain economic profits, strengthen its security alliance, and achieve additional long-term objectives or further a long-term strategy.

The four main recommendations are summarized below.

A summary of the four recommendations for Korean shipbuilders regarding maritime-industrial cooperation.

Recommendation	Characteristics
Increase MRO agreements	Underway Least political resistance Korea has available infrastructure
Acquire American shipyards & Establish U.S. subsidiaries of Korean shipbuilders	Underway Some mutual benefit (localized production, creates jobs) Form of foreign direct investment Some risks (can be seen as a long-term threat by local competitors) Recently implemented (Hanwha Philly Shipyard) Historical precedent (Austal, BAE, Fincantieri) Supplementary regulatory benefits (less liability, tax benefits etc.)

Recommendation	Characteristics
Form strategic partnerships	Recently implemented (HD Hyundai - Huntington Ingalls Industries) Historical precedent (Navantia, Babcock, etc.) Includes next-gen technology cooperation
Construct new shipyards	⚠️Not yet implemented Can be more cost-efficient May have more control in the design MRO specialized shipyard

Increase maintenance, repair, and overhaul agreements

The first step that South Korean shipbuilders can take is to secure more maintenance, repair, and overhaul (MRO) contracts with the United States Navy. MRO consists of operations on active vessels to ensure they will continue to be in prime working condition during missions. These operations consist of restoration and repair work. All four active public naval shipyards operated by the United States Navy engage in MRO work, particularly in technologically advanced vessels like nuclear submarines. However, because of the limited number of shipyards capable of operating on naval vessels, the speed at which MRO work is being completed is increasingly delayed, and overrun costs continue to rise.²⁵⁾ The lack of sufficiently available, useable, and modern dry docks complicates the issue. Dry docks are narrow basins or vessels that can be flooded to allow a ship to come in, then drained so that maintenance work can begin on dry ground. Estimates reveal that nearly forty percent of all ships fail to have MRO completed on time, raising significant concerns about future naval readiness in a contingency.

As a response, USN announced the Shipyard Infrastructure Optimization Program in 2018, designed to implement a nation-wide overhaul of the nation’s dry docks, facilities, and equipment.²⁶⁾ This plan would theoretically alleviate some of the challenges posed by constant delays and rising costs of MRO work. However, the SIOP has stalled, and the Navy has been unable to produce a comprehensive estimation of the scheduling and costs of the program, rendering it ineffective until

25) John Grady, “GAO Tells Senate Panel U.S. Shipyards Are Major Readiness Concern,” *USNI News*, May 07, 2024. <https://news.usni.org/2024/05/07/gao-tells-senate-panel-u-s-shipyards-are-major-readiness-concern>

26) Ibid.

at least 2025. None of the individual shipyards operated by the Navy have completed their own respective cost and schedule planning analyses.²⁷⁾ This leaves the Navy with a significant challenge in finding way to address the backlog in MRO appointments.

Here, Korean shipbuilders could step in. Because maintenance and repairs are not creating a brand-new vessel, these operations are outside of the boundaries covered by the Jones Act, therefore enabling foreign countries to play a role. Precedents include RUAG Australia, which secured two different contracts for the United States Navy in 2020, including the MH-60R Seahawk helicopters and F/A-18 Hornet combat aircraft.²⁸⁾ Although 10 U.S.C. § 8680 acts as a legal barrier, forward-deployed vessels and other limited exceptions have already been granted.

South Korean companies have already made inroads in the MRO space. HD Hyundai Heavy Industries (HD HHI) signed an master ship repair agreement (MSRA) with the United States Navy's Naval Supply Systems Command (NAVSUP).²⁹⁾ As the first agreement between a South Korean shipyard and the United States Navy, it allows HD HHI to bid on future MRO projects including NAVSUP's support vessels and USN's combat vessels.³⁰⁾ The company's rival, Hanwha Ocean Co., Ltd. (Hanwha Ocean), which also signed a MSRA with NAVSUP in July 2024, provided MRO services for the *USNS Wally Schirra*, a dry cargo and ammunition vessel, and *USNS Yukon*, a replenishment oiler.³¹⁾ HD Hyundai also secured a contract for the *USNS Alan Shepard*.³²⁾ All three ships are Military Sealift Command (MSC) auxiliary vessels,

27) Ibid.

28) "RUAG Australia secures new US MH-60R Seahawk contract," *Australian Defense Magazine*, October 29, 2020. <https://www.australiandefence.com.au/news/ruag-australia-secures-new-u-s-mh-60r-seahawk-contract>

29) "South Korea's HD HHI Inks MRO Agreement with the US Navy," *Naval News*, July 11, 2024. <https://www.navalnews.com/naval-news/2024/07/south-koreas-hd-hhi-inks-mro-agreement-with-the-us-navy/>

30) Ibid.

31) Woo-Sub Kim, "Korea's Hanwha wins US Navy MRO deal as Trump seeks deeper shipbuilding ties," *Korea Economic Daily*, November 12, 2024. <https://www.kedglobal.com/aerospace-defense/newsView/ked202411120017>

32) "HD HHI Secures MRO Contract for USNS Alan Shepard," *Naval News*, August 07, 2025. <https://www.navalnews.com/naval-news/2025/08/hd-hhi-secures-mro-contract-for-usns-alan-shepard/>

which are civilian-crewed ships that support naval operations.³³⁾ The vessels were forward-deployed and repaired under either a regular overhaul (ROH) contract for Hanwha and scheduled overhaul contract for HD Hyundai, which allowed both companies to be exempt from 10 U.S.C. § 8680. These examples demonstrate South Korea's growing role in MRO support for the United States.

There are several ways to build on this momentum. First, South Korean shipbuilders can leverage the Department of War's Regional Sustainment Framework, which identified Indo-Pacific allies that create a resilient defense ecosystem through collaboration on sustainment strategies.³⁴⁾ South Korean companies can expand MRO facilities in domestic and international shipyards in proximity to USN. For example, HD HHI recently acquired part of the Subic shipyard in the Philippines to service the Seventh Fleet for MRO work.³⁵⁾ Within the ROK, Chinhae (Jinhae), home to the United States' sole naval base in continental Asia, has K Shipbuilding Co., Ltd, which already made inroads in exporting oil tankers and medium-sized container ships, and could provide MRO services for USN or NAVSUP in the future.³⁶⁾

Expanding MRO operations is the most straightforward out of the options available to South Korean shipbuilders. It requires the least alteration of South Korean shipyards, as MRO facilities already exist for domestic needs. MRO contracts are also relatively plentiful. Finally, domestic opposition within the United States to outsourcing MRO contracts is relatively milder, as it does not carry the political weight of new build and carries fewer security risks. Therefore, initial bilateral maritime-industrial cooperation should start through MRO contracts and operations.

www.navalnews.com/naval-news/2025/08/hd-hhi-secures-mro-contract-for-usns-alan-shepard/

33) "Ships of MSC," *Military Sealift Command, United States Navy*, Accessed August 10, 2025. <https://sealiftcommand.com/about-msc/ships-msc>

34) "2024 Regional Sustainment Framework," *US Department of Defense*, Accessed December 09, 2024. <https://www.acq.osd.mil/asds/docs/RSF-9MAY24.pdf>

35) Michael Herh, "HD HHI to Build Warship MRO Service Base in Philippines," *BusinessKorea*, May 30, 2024. <https://www.businesskorea.co.kr/news/articleView.html?idxno=218108>

36) "Korean Investors in K Shipbuilding Expand Buying Daehan Shipbuilding," *Maritime Executive*, September 02, 2022. <https://maritime-executive.com/article/korean-investors-in-k-shipbuilding-expand-buying-daehan-shipbuilding>

Acquire American shipyards and establish a U.S. subsidiary

The second strategy that South Korean shipbuilders can pursue is to acquire shipyards in the United States and establish a U.S. subsidiary. The two actions are linked due to three separate U.S. government processes concerning foreign companies and defense technology. For foreign investments and acquisitions of “critical sectors” such as shipbuilding, actions are subject to reviews by the Committee on Foreign Investment in the United States (CFIUS).³⁷⁾ CFIUS approval often requires that operations in the U.S. be conducted under a U.S. incorporated entity, or with a leadership controlled by U.S. nationals. After an acquisition is approved, for a company to access DoW contracts, it must undergo a mitigation process that addresses security concerns from foreign ownership, control or influence (FOCI).³⁸⁾ Finally, if a foreign company successfully establishes a U.S. subsidiary and gains access to U.S. defense contracts, for any technology developed that the parent company wishes to acquire, compliance with the State Department’s International Traffic in Arms Regulations (ITAR) to legally export overseas.³⁹⁾

Here, there is also precedent demonstrated by Hanwha Ocean’s acquisition of Philly Shipyard, the commercialized remnant of the Philadelphia Naval Shipyard, the birthplace of USN.⁴⁰⁾ Although it is unclear whether Hanwha meets the criteria to receive a DCSA clearance via entering a mitigation agreement, it is implied that Hanhwa’s initial acquisition of Philly Shipyard suggests that the company will push for a similar arrangement.

Hanwha’s acquisition of the shipyard will give access to the commercial shipbuilding

37) Cathleen Cimino-Isaacs and Karen Sutter, “Committee on Foreign Investment in the United States (CFIUS)” (Washington, DC: Congressional Research Service, May 29, 2025). <https://www.congress.gov/crs-product/IF10177>

38) “Foreign Ownership, Control or Influence,” *Defense Counterintelligence and Security Agency*, Accessed October 04, 2025. <https://www.dcsa.mil/FOCI/>

39) “The International Traffic in Arms Regulations (ITAR),” *U.S. Department of State Directorate of Defense Trade Controls*, Accessed October 04, 2025. https://www.pmddtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=24d528fddbfc930044f9ff621f961987

40) “Hanwha to acquire Philly Shipyard,” *Philly Shipyard*, June 20, 2024. <https://www.phillyshipyard.com/hanwha-to-acquire-philly-shipyard/>

market in the United States. This market allows access to foreign companies if the construction operations are done from a domestic American shipyard as per the Jones Act. Hanwha paid just \$100 million for the shipyard, and is likely to receive significant regulatory and tax credit provisions.⁴¹⁾ On a broader level, the investment strengthens economic security coordination by boosting the total production figures for the U.S. while securing long-term contracts for the ROK.

Since the acquisition, Hanwha and Philly Shipyard have positioned to compete with Wisconsin's Marinette Marine to construct additional *Constellation-class* guided missile frigate ships.⁴²⁾ Though Marinette contracted for ten ships, only one is under construction and three are under contract, with delays until 2029.⁴³⁾ This leaves Philly Shipyard under Hanwha's management a potential contender. Hanwha Defense USA, Hanwha's U.S., has also identified unmanned surface vessels, icebreakers, training vessels and other Navy auxiliary ships as future targets.⁴⁴⁾

Not all acquisitions are successful. Hanwha's attempt to acquire Australia's Austal fell through, although recent months have seen conflicting opinions between Austal and Canberra.⁴⁵⁾ Austal's shipyard in Alabama is another major source of military vessels for USN, including *Independence-class* littoral combat ships, *Spearhead-class* expeditionary fast transport ships, and *Heritage-class* cutter ships.⁴⁶⁾ Given that

41) Troy Stangarone, "IRA benefits Korea," *Korea Times*, January 10, 2024. https://www.koreatimes.co.kr/www/opinion/2024/12/137_366581.html

42) "Constellation Class - FFG," *United States Navy*, July 31, 2024. [https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2633250/#:~:text=The%20Constellation-Class%20Guided-Missile%20Frigate%20\(FFG%2062\)%20represents%20the%20Navy%E2%80%99s%20next](https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2633250/#:~:text=The%20Constellation-Class%20Guided-Missile%20Frigate%20(FFG%2062)%20represents%20the%20Navy%E2%80%99s%20next)

43) Wilson Beaver, "Philly Shipyard's Transformation: How Hanwha's Investment Is Driving U.S. Navy Readiness," *Heritage Foundation*, October 31, 2024. <https://www.heritage.org/defense/commentary/philly-shipyards-transformation-how-hanwhas-investment-driving-us-navy-readiness>

44) Valerie Insinna, "New Hanwha Defense USA exec sets sights on Navy contracts for Philly Shipyard," *Breaking Defense*, October 10, 2024. <https://breakingdefense.com/2024/10/new-hanwha-defense-usa-exec-sets-sights-on-navy-contracts-for-philly-shipyard/>

45) Hyeong-woo Kan, "Hanwha eyes another shipyard takeover in US," *Korea Herald*, October 15, 2024. <https://www.koreaherald.com/view.php?ud=20241015050553>

46) Jerry Underwood, "Austal to add over 1,000 jobs with expansion of Mobile shipyard," *Made in Alabama*, July 09, 2024. <https://www.madeinalabama.com/2024/07/austal-to-add-over-1000-jobs-with-expansion-of-mobile-shipyard/>

Philly Shipyard's production range encompasses auxiliary ships, a proven shipyard producing military vessels would be a logical next step that enables Hanwha to produce commercial, military, and dual-use ships for the American market.

Certain foreign defense companies have opted for a special arrangement with the U.S. government that allows greater market access to sensitive defense contracts. This system, known as the National Industry Security Program (NISP) is administered by the Defense Counterintelligence and Security Agency (DCSA).⁴⁷⁾ One option the company can take is to enter a Security Control Agreement (SCA). In an SCA, the foreign company does not fully own the U.S.-based company. When a foreign company has a majority stake in the U.S. subsidiary, it can choose to enter either a Special Security Agreement (SSA) or Proxy Agreement based on the nature of the defense projects it aims to pursue. In an SSA, the U.S. subsidiary is owned by the foreign parent company and it retains overall business decision-making rights, but cedes control in areas related to sensitive defense information.⁴⁸⁾ A separate U.S. board appointed by the DCSA and SSA Committee handle classified information and operations, siloed off from the rest of the subsidiary. Proxy agreements go further, and the foreign company only retains profit rights while decision-making is left to U.S. proxy holders or trustees.⁴⁹⁾

Established European and Australian defense companies serve as a guidance point for South Korean shipbuilders, offering several different models. Some companies have opted to pursue SSAs with the DCSA. Austal has an SSA.⁵⁰⁾ BAE Systems, although only having repair operations in the U.S., also entered an SSA because of its work on combat

47) "National Industrial Security Program Oversight," *Defense Counterintelligence and Security Agency*, Accessed October 01, 2025. <https://www.dcsa.mil/Industrial-Security/National-Industrial-Security-Program-Oversight/>

48) Daniel B. Pickard, "Navigating the Law: The Defense Counterintelligence and Security Agency (DCSA) and Foreign Ownership, Control or Influence (FOCI) Handbook," *Buchanan Ingersoll & Rooney*, September 2023, 5.

49) "Amended and Restated Proxy Agreement, Leonardo DRS, Inc.," *U.S. Securities and Exchange Commission*, Accessed October 01, 2025. <https://www.sec.gov/Archives/edgar/data/1833756/000162828021004281/exhibit102-sx1aexhibitonly.htm>

50) "Littoral Combat Ship (LCS)," *Austal*, Accessed October 02, 2025. <https://www.austal.com/ships/littoral-combat-ship-lcs>

ships.⁵¹⁾ Fincantieri's acquisition of Manitowoc Co. Inc's marine segment led to its current ownership of subsidiaries Fincantieri Marine Group and Fincantieri Marine Systems. Through these acquisitions, the company oversees construction of the *Constellation*-class frigates. Their experiences suggest that if Korean shipbuilders sought to move beyond commercial and auxiliary shipbuilding, it may face a barrier due to the sensitive technologies involved in the construction of some of the Navy's cutting-edge vessels. To meet the standards required to produce such cutting-edge technology, an SSA or proxy agreement with the United States may need to be signed, giving more control to the United States rather than the original country the company is based in.⁵²⁾

Other European companies have opted for alternative strategies. Spain's Navantia and the Netherlands' Damen opted out of a physical presence in the U.S. Like Hanwha Ocean and HD HHI's recent MRO contracts of forward-deployed (stationed overseas) U.S. auxiliary ships, Navantia also had contracts to repair U.S. ships in its Spanish ports using the same exemptions from 10 U.S.C. § 8680. Damen licenses its ship designs to U.S. shipyards to be built in America, which then meets Jones Act standards. South Korean shipbuilders must make the relative cost calculations and strategic planning necessary to determine whether their current levels of engagement (comparable to Navantia) are sufficient, or if specialized, higher-level technological cooperation through a FOCI arrangement (like Austal, BAE, and Fincantieri) is preferable.

A comparison of major foreign shipbuilders that have some U.S.-focused operations.

Company	U.S. Entity	Activity	FOCI
Austal (AU)	Yes	Newbuilds	SSA
BAE (UK)	Yes	MRO (in US)	SSA
Damen (NL)	No	Licensing Partnership	N/A
Fincantieri (IT)	Yes	Newbuilds, MRO	SCA-SSA
Mitsubishi (JP)	No	Contract MRO	N/A
Navantia (ES)	No	Contract MRO	πN/A

51) "BAE Systems Maritime Solutions Norfolk," *BAE Systems*, Accessed October 02, 2025. <https://www.baesystems.com/en-us/product/maritime-solutions-norfolk>

52) Leonardo DRS Proxy Agreement, SEC. <https://www.sec.gov/Archives/edgar/data/1833756/000162828021004281/exhibit102-sx1aexhibitonly.htm>

Establish partnerships with U.S. entities

If Hanwha Ocean's strategy is to establish itself as a key player within the U.S. shipbuilding ecosystem, HD Hyundai has instead pursued strategic partnerships with existing U.S. players to jointly pursue shipbuilding ventures. Partnerships with U.S. entities can mitigate some of the risks with entering the U.S. market alone as Hanwha Ocean has done. The U.S. partner likely has extensive know-how and an established business footprint. HD Hyundai's partnerships include U.S. shipbuilders, financial firms and tech companies. In the first group, U.S. shipbuilder Huntington Ingalls Industries (HII) signed an MOU with HD Hyundai Heavy Industries to collaborate in commercial and defense shipbuilding.⁵³⁾ The two countries signed another memorandum in October 2025, which looks at initiatives such as distributed shipbuilding, which relies on expanding networks of modular manufacturing.⁵⁴⁾ In the second group, Cerberus Capital Management and HD Hyundai announced a strategic partnership and a new maritime investment strategy focusing on high-value U.S. shipbuilding investment opportunities.⁵⁵⁾ Finally, HD Hyundai's partnerships with tech giants Anduril Industries and Palantir Technologies open new opportunities for maritime-industrial co-development and manufacturing cooperation by exchanging autonomy technology and solutions between the companies.⁵⁶⁾ In this manner, HD Hyundai is pursuing initiatives with U.S. shipbuilding stakeholders to achieve its goals.

53) Brad Lendon, "US and South Korean warship makers sign deal that could help narrow naval race with China," *CNN*, April 8, 2025. <https://edition.cnn.com/2025/04/08/business/us-south-korea-military-shipbuilding-deal-intl-hnk-ml/index.html>

54) "HD Hyundai Heavy Industries and HII Execute Memorandum of Agreement to Collaborate on Distributed Shipbuilding and Pursue Teaming on Auxiliary and Commercial Vessels," *Huntington Ingalls Industries*, October 26, 2025. <https://hii.com/news/hd-hyundai-heavy-industries-and-hii-execute-memorandum-of-agreement-to-collaborate-on-distributed-shipbuilding-and-pursue-teaming-on-auxiliary-and-commercial-vessels/>

55) "Cerberus and HD Hyundai Announce Strategic Partnership to Launch Cerberus Maritime," Cerberus (press release), August 25, 2025. <https://www.cerberus.com/media/cerberus-and-hd-hyundai-announce-strategic-partnership-to-launch-cerberus-maritime/>

56) "HD Hyundai Expands Cooperation with Anduril," *Naval News*, August 15, 2025. <https://www.navalnews.com/naval-news/2025/08/hd-hyundai-expands-cooperation-with-anduril/>

Construct new shipyards

Some have argued that due to the risks in the U.S. shipbuilding industry, ROK shipbuilders may instead consider inherent constructing entirely new shipyards.⁵⁷⁾ The motivation behind this option is due to the unpredictable, unreliable estimates of shipyard modernization from U.S. sources. As an example, the General Accountability Office (GAO) in 2022 pointed out inconsistencies in the cost estimates calculated by the Navy for modernizing dry docks in its four public shipyards. The GAO notes that costs for USN's SIOP have grown by over four hundred percent since 2018, reflecting inflation and additional costs of replacing aged utilities including drydocks.⁵⁸⁾ Not only is the Navy's original estimate of \$21 billion over 20 years not accurate, but the plan itself that the amount is to fund is also flawed. The fundamental issue is that the costs delineated for the SIOP at best can only address the Navy's capability to maintain the current nuclear fleet of carriers and submarines, not the expanded fleet and merchant marine.⁵⁹⁾

The strategically driven focus of the Navy on modernizing the four publicly-owned shipyards and the lack of resources available to address the issues with pre-existing private shipyards is precisely the opportunity that is presented for Korean shipbuilders to construct a new shipyard. Currently, private shipyards in the United States actually produce ships while public shipyards engage in MROs. However, a South Korean-owned, American-based shipyard could be designed to only take on MRO operations and reduce the burden on the public shipyards. For the Korean side, it may become less of a financial burden as a shipyard that also has construction facilities.⁶⁰⁾ This would benefit the Navy in reducing the burden of MROs, avoid

57) Craig Hooper, "How To Keep South Korean Shipbuilders From Running Aground In America," *Forbes*, May 22, 2024. <https://www.forbes.com/sites/craighooper/2024/05/22/how-to-keep-south-korean-shipbuilders-from-running-aground-in-america/>

58) John Grady, "Navy Cost Estimates on Shipyard Modernization 'Wildly Off,' GAO Tells Congress," *USNI News*, May 11, 2022. <https://news.usni.org/2022/05/11/navy-cost-estimates-on-shipyard-modernization-wildly-off-gao-tells-congress>

59) Maiya Clark, "U.S. Navy Shipyards Desperately Need Revitalization and a Rethink," *Heritage Foundation*, July 29, 2020. <https://www.heritage.org/defense/report/us-navy-shipyards-desperately-need-revitalization-and-rethink>

60) Subhodeep Ghosh, "Types of Shipyards Explained," *Marine Insight*, February 18, 2022. <https://www.marineinsight.com/types-of-shipyards-explained/>

sensitive issues of technological transfers regarding the construction of nuclear vessels, and is a lower threat by other U.S. shipbuilders given their almost exclusive contracts with USN. The factors above strongly suggest that a construction of a new, MRO-focused shipyard may benefit both sides.

Alternatively, a new shipyard may leverage new technologies and establish a new niche. An example is Saronic Technologies' planned "Port Alpha," an shipyard that will develop autonomous surface vehicles and other vessels designed for future warfighting.⁶¹⁾ Although the project will require different skillsets and resources compared to traditional shipyards, Korean shipbuilders have already begun factoring in these new technologies into their workflows. For example, Hanwha Ocean is already working with the ROK Navy and Agency for Defense Development (ADD) to develop unmanned water vessels among other new technologies.⁶²⁾ HD Hyundai is spearheading its Future of Shipyard (FOS) project in cooperation with Palantir and other companies, to introduce digital transformation processes and enhance productivity and safety standards.⁶³⁾ In this way, both shipbuilders reflect their respective strategies in their contrasting methods of adapting to the advent of disruptive emerging technologies.

4. Challenges

In addition to the legal and economic barriers inherent to the current American shipbuilding industry, there are proven challenges that have not been addressed. First, the track record for foreign acquisitions of American shipyards has had mixed success. Two of the high-profile vessels Fincantieri was contracted to build have

www.marineinsight.com/naval-architecture/types-of-shipyards-explained/

61) Courtney Albon, "Saronic unveils plans for autonomous shipyard," *Defense News*, February 18, 2025. <https://www.defensenews.com/naval/2025/02/18/saronic-unveils-plans-for-autonomous-shipyard/>

62) Jae-hyuk Park, "Hanwha Ocean committed to advancements in green tech, naval ships," *The Korea Times*, March 25, 2024. <https://www.koreatimes.co.kr/business/companies/20240325/hanwha-ocean-committed-to-advancements-in-green-tech-naval-ships>

63) Hyeong-woo Kan, "HD Hyundai leader reaffirms will to build automated shipyard," *The Korea Herald*, February 28, 2025. <https://www.koreaherald.com/article/10431325>

come under scrutiny.⁶⁴⁾ One was the center of a major political scandal over significant issues in its design and operation, while the other faces production delays.⁶⁵⁾ The labyrinth of regulations paired with a potential lack of government support may deter South Korean shipbuilders looking to enter the American market through acquisitions. On the South Korean side, recent success belies just as recent failures, such as the scrapping of \$290 million worth of LNG tankers that were never utilized.⁶⁶⁾

A second source of concern may be domestic politics in the United States. While an enhanced role for South Korea may be welcomed by Navy, it may become more difficult to accommodate the views and interests of private-industry stakeholders that may see South Korean companies as a long-term competitor or threat. Even within the American government, stakeholders representing interest groups relevant to the shipbuilding industry may pressure South Korean companies to offer increasingly difficult concessions. Examples of concessions include greater proportions of American labor used in shipyards, or increased cost burden from the South Korean side in any potential shipyard modernization or construction effort. The same domestic concerns from the United States also make it difficult to consider other potential solutions. Domestic politics may also inadvertently hinder cooperation, demonstrated by a recent raid by Immigration and Customs Enforcement (ICE) of South Korean factory workers in Georgia.⁶⁷⁾

Finally, there is a risk from the ROK as well. Unlike the synergy and coexistence of

64) Joaquin Sapien, "The Inside Story of How the Navy Spent Billions on the "Little Crappy Ship," *ProPublica*, September 07, 2023. <https://www.propublica.org/article/how-navy-spent-billions-littoral-combat-ship>

65) Peter Suci, "The U.S. Navy's Constellation-class Frigate Nightmare Is Bad News," *National Interest*, May 13, 2024. <https://nationalinterest.org/blog/buzz/us-navys-constellation-class-frigate-nightmare-bad-news-210576>

66) Craig Hooper, "How To Keep South Korean Shipbuilders From Running Aground In America," *Forbes*, May 22, 2024. <https://www.forbes.com/sites/craighooper/2024/05/22/how-to-keep-south-korean-shipbuilders-from-running-aground-in-america/>

67) Michel Martin and Sam Gringlas, "A Look at the Political Fallout from the Immigration Raid at a Georgia Hyundai Plant," *NPR*, September 12, 2025. <https://www.npr.org/2025/09/12/nx-s1-5535657/a-look-at-the-political-fallout-from-the-immigration-raid-at-a-georgia-hyundai-plant>

companies in China and Japan, the tense personal relationship between HD HHI and Hanwha Ocean defines the ROK landscape. The rivalry directly led to the failure of both companies in securing the bid for the Australian Navy's frigate project.⁶⁸⁾ Although the recent rapprochement between the two companies alleviated some concerns, risks of flare-ups in the relationship such as in the Korean Next-Generation Destroyer (KDDX) may jeopardize the ROK's ability to secure future bids.⁶⁹⁾ Managing these potential conflict points is crucial for any maritime-industrial cooperation.

5. Conclusion

The landscape around shipbuilding continues to alternate between explosive evolution and stagnant deadlock. For example, President Trump named Florida Congressman Mike Waltz, one of the original architects for the SHIPS Act, as his pick for national security adviser, increasing the chance that shipbuilding receives greater attention in the context of bolstering American security.⁷⁰⁾ But Waltz's tenure lasted five months, limiting his ability to shape the national agenda.⁷¹⁾ Similarly, the discussions between then-President Yoon Suk Yeol and President Trump had limited impact after Yoon's impeachment.⁷²⁾ The new Lee Jae Myung administration appears determined to continue the momentum in shipbuilding dialogue, exemplified by the "Make America Shipbuilding Great Again (MASGA)" pitch by Seoul just before President Lee's first bilateral summit with President Trump.⁷³⁾ Although

68) Jae-hyuk Park, "HD Hyundai-Hanwha rapprochement boosts prospects for Canada sub bid," *Korea Times*, December 02, 2024. https://www.koreatimes.co.kr/www/tech/2024/12/129_387485.html

69) Ibid.

70) Catie Edmondson, "Who is Michael Waltz, Trump's pick to be national security adviser?" *New York Times*, November 17, 2024. <https://www.nytimes.com/2024/11/12/us/politics/who-is-michael-waltz-trump.html>

71) Joshua Zeitz, "Mike Waltz Fell Into an Age-Old Trap in Political History," *Politico*, May 18, 2025. <https://www.politico.com/news/magazine/2025/05/18/mike-waltz-firing-signalgate-hi-story-00355605>

72) Steven Borowiec, "South Korea shipbuilders face choppy course as Trump opportunity knocks," *Nikkei Asia*, January 10, 2025. <https://asia.nikkei.com/spotlight/policy-asia/south-korea-shipbuilders-face-choppy-course-as-trump-opportunity-knocks>

73) Timothy Martin and Soobin Kim, "The New Acronym Driving South Korea's Summit With Trum

these developments are recent, the possibility of positive change in the policy landscape remains significant.

There are also some limitations with the paper. First, the lack of access to certain sources, such as testimonies from South Korean corporate representatives, hinder more intensive analysis to some degree. In addition, it did not consider additional dimensions to maritime-industrial cooperation, such as the potential for South Korea to export separate parts to American shipyards to be assembled into the final vessel in order to meet Jones Act requirements, an option that is being increasingly considered. More attention could have been given to potential differences between Washington and Seoul regarding labor, given U.S. interests in creating more domestic manufacturing jobs in an industry increasingly characterized by automation. It could also utilize more primary sources, including industrial statistics. Finally, it did not consider R&D collaboration in maritime-industrial technology pertaining to the innovation within shipyards themselves, including automation and AI-enabled solutions

Despite these limitations, the paper frames shipbuilding in the context of industrial capacity-building, economic security, technological innovation and national power. It identifies core options that South Korean shipbuilding companies can take in order to advance maritime-industrial cooperation with the United States. Given the upwards momentum within the United States to work with allies to modernize American shipbuilding, it is likely that with the addition of any potential revision of regulations, decision-making and maneuverability of Korean shipbuilders will only increase. Although the policies suggested are primarily actions that are taken by South Korean companies with additional American assistance, corporate actions are ultimately contingent on the U.S. stakeholders developing a common consensus on the role of allies and partners in achieving its strategic goal of shipyard

p: MASGA," *Wall Street Journal*, August 24, 2025. https://www.wsj.com/world/asia/the-new-acronym-driving-south-koreas-summit-with-trump-masga-aed1aad9?gaa_at=eafs&gaa_n=AWEt sqcLMbwFSPIWgEfai5L0bEbG-uKInEe1wp_IXTL4YlctXsgpCk7NBANBEdmekHU%3D&gaa_ts=68fcf1cb&gaa_sig=QdwgrSGB1RAAq70OZB7OP6QgEXyQgBVSudVFJDw1pcTpKsN4tplPrguTeHZqt4NwuWdz1dEPSdsRPwM3_42otw%3D%3D

modernization. Such a consensus will create opportunities to adapt the limiting factors of the aforementioned regulations to modern geopolitical and economic realities. The outcome of such a revision, if at all, will further demonstrate evolution of shipbuilding into a new frontier within the broader bilateral alliance.

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X. U.S. and South Korea Shipbuilding Cooperation : Legal Huddles and Remedies

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1. Introduction

Shipbuilding is critical for the U.S. to maintain strategic advantage over China, making South Korea an essential partner in this effort. The strategic competition between the U.S. and China has intensified, with the primary arena of confrontation being the maritime domain. At the same time, shipbuilding is not merely an issue—it is *the* issue at the heart of U.S.-South Korea cooperation such as MASGA(Make America Shipbuilding Great Again) Project.

During World War II, while Europe saw land-based conflict led by Germany and Italy, the Pacific War between the U.S. and Japan primarily involved naval battles, such as the pivotal Battle of Midway¹). Similarly, today's U.S.-China competition unfolds largely at sea, requiring a strong fleet of naval and commercial vessels. However, American shipbuilding has been in decline as the U.S. industrial base shifted from manufacturing to information technology and service sectors, causing labor-intensive industries like shipbuilding to deteriorate²).

Although the U.S. aims to restore its shipbuilding capacity and South Korea has both the expertise and willingness to assist, signifacant obstacles remain. These are generally divided into political obstacles—stemming from U.S. governmental structures and policies—and industrial challenges inherent to the shipbuilding sector.

1) The Battle of Midway, fought from June 4-7, 1942, was a pivotal naval battle in World War II where U.S. forces, aided by codebreaking, ambushed and decisively defeated Japan's fleet near Midway Atoll.

2) In terms of manufacturing automation, shipbuilding is one of the slowest industries to adopt these technologies. Unlike the automotive industry, which produces hundreds of thousands of identical vehicles, shipbuilding involves custom, complex designs that cannot be mass-produced at such scale.

This study primarily examines the political and legal barriers hindering the revitalization of U.S. shipbuilding, reviews recent legislative efforts to mitigate these barriers, and offers policy recommendations to enhance U.S.-South Korea cooperation.

This study focuses on political obstacles to U.S. shipbuilding revitalization with South Korea by examining existing policies and legal constraints. It conducts a detailed analysis of legal and regulatory barriers that impede growth in the American shipbuilding industry. Furthermore, the study reviews recent legislative efforts aimed at mitigating or repealing restrictive laws. It also highlights bills that propose reforms to facilitate foreign engagement, especially with South Korea. Finally, the study offers policy recommendations designed to overcome these legal hurdles and enhance bilateral cooperation in shipbuilding.

2. US-China Strategic Competition and Shipbuilding

The U.S.-China strategic competition spans various fields, from security to the economy. This competition creates unique dynamics far different from the U.S.-Soviet competition during the Cold War. Unlike the predominantly military focus of the Cold War, today's competition intertwines economic and security issues. Shipbuilding is one area that highlights the nature of this competition.

Over recent decades, the American economy has shifted from productive industries to service industries, leading to a sharp decline in shipbuilding—a sector often labeled as “3D”: difficult, dirty, and dangerous³⁾. Despite the decline of American shipbuilding industry, the U.S.-China competition necessitates a higher rate of shipbuilding in the U.S. Both nations, situated on opposite sides of the Pacific Ocean, rely heavily on naval power.

The Chinese Communist Party has significantly increased investments in military modernization, leading to a substantial expansion of the PLA Navy. Since 2020, the

3) Hong Da-yeong, “Ulsan shipyards recruit 280 Uzbek workers to tackle labor shortage”. March 13, 2025. Ulsan shipyards recruit 280 Uzbek workers to tackle labor shortage - CHOSUNBIZ

U.S. Department of Defense has acknowledged that the PLA Navy's ship count exceeds that of the U.S. Navy⁴). To compete effectively, the U.S. must revive its shipbuilding industry. Given South Korea's position as the second-largest shipbuilding nation, collaboration offers a promising solution.

3. South Korea's Shipbuilding Capability and Hanwha Philly Shipyard

The global shipbuilding industry today is overwhelmingly dominated by three countries—China, South Korea, and Japan—which together account for more than 85 percent of total shipbuilding output worldwide. China alone produces around half of the world's commercial ships and secured nearly 70 percent of new vessel orders by tonnage in 2024. South Korea follows with about 28 percent of the global share, specializing in high-value and technologically advanced ships such as LNG carriers and naval vessels. Japan ranks third, holding roughly 15 percent of the market, maintaining strength in mid-sized and specialized vessels⁵). Beyond these three nations, other regions including Europe, the Americas, and Southeast Asia collectively represent less than 15 percent of global shipbuilding activity. The overall market is valued at approximately USD 150-160 billion and is projected to reach nearly USD 200 billion by 2030. Asia remains the epicenter of the industry due to its integrated supply chains, lower production costs, and strong government-industry coordination. This concentration raises strategic concerns about global supply chain resilience and industrial dependence.

Meanwhile, global demand continues to rise as fleets modernize for environmental regulations and energy efficiency. Nevertheless, structural challenges—such as aging workforces, labor shortages, high capital requirements, and overcapacity—remain persistent obstacles to the sector's sustainable growth.

4) U.S. DOD, . Report on Military and Security Developments Involving the People's Republic of China. Sept. 1, 2020. DOD Releases 2020 Report on Military and Security Developments Involving the People's Republic of China › U.S. Department of War › Release | U.S. Department of War

5) Zahra Ahmed, "Top 5 Countries Dominating Global Shipbuilding in 2025", *The Marineinsight*. July 17, 2015. <https://www.marineinsight.com/know-more/top-5-countries-dominating-global-shipbuilding-in-2025/>

Since this year January 20, President Trump's inauguration day, his administration has pursued policies in domestic and foreign politics that are clearly distinct from those of his predecessor. However, in the context of the shipbuilding industry, the Trump administration is continuing the Biden Administration's favor and support. Members of Congress also have introduced bills that align with this trend⁶⁾.

Recognizing this favorable political climate, in December 2024, Hanwha Defense Industry acquired the Philly Shipyard. This move is part of a broader effort to capitalize on the growing opportunities within the U.S. shipbuilding sector. Additionally, Hyundai Heavy Industry, another Republic of Korea major defense company, has recently explored entering this market. The Hanwha Philly Shipyard is a tangible outcome of U.S.-South Korea cooperation in shipbuilding. Initially, the Pentagon tested South Korea's capabilities through smaller projects, such as maintenance, repair, and operations (MRO), which South Korea passed successfully⁷⁾. To strengthen its foothold, Hanwha hired a new CEO for the shipyard in December and dispatched dozens of experts from its headquarters in Seoul. The company has also taken proactive steps by posting new positions and organizing hiring events online⁸⁾.

Philly Shipyard, a historic site in American shipbuilding, has seen significant decline. Once known for constructing state-of-the-art warships, it now primarily builds commercial and Coast Guard vessels. The workforce has shrunk due to COVID-19, and the supporting infrastructure is outdated. During the procurement process, other prominent companies, including Fincantieri and Hyundai Heavy Industry, considered acquiring Philly Shipyard but ultimately withdrew due to apparent risks. Hanwha's decision to proceed highlights its long-term vision despite these challenges.⁹⁾ More

6) If you see more detail about the bill, refer to the link: Utah's Senators Introduce Bills for Navy and Coast Guard Readiness - Mike Lee US...

7) "Hanwha Ocean Becomes First South Korean Shipyard to Secure U.S. Navy MRO Contract," *Naval News*, August 29, 2024, <https://www.navalnews.com/>.

8) Hanwha Phillyship Yard is hairing lobors : My Job Search

9) Jae-hyuk Park, "Hanwha Ocean confident in benefits of Trump presidency" *The Korea Times*, Jan 24, 2025. Hanwha Ocean confident in benefits of Trump presidency - The Korea Times. For the challenges and remedies of Hanwha Phillyship Yard facing, refer to the article : Park,

over, Hanhwa Philly Shipyard has been designated when President Trump approved South Korean nuclear powered submarine in condition of being build at the shipyard.¹⁰⁾ In specific, South Korean president Lee officially asked him to allow to acquire nuclear powered submarine during the summit, October 29. Then, the shipyard once again becomes critical assets with regard to cooperation of shipbuilding between South Korea and the U.S.

4. Major U.S. Laws and Regulations that Prevent Foreign Countries from Cooperating in the Shipbuilding Industry

Several laws and regulations support domestic shipbuilding but also hinder foreign companies from fully engaging in the U.S. shipbuilding market. This study analyzes four major laws and regulations frequently cited in research and media, summarized in Table 1.

- Merchant Marine Act of 1920 (Jones Act)¹¹⁾:

When discussing U.S. shipbuilding regulations, the Jones Act is often cited because of its long-standing history. It is sponsored by Senator Wesley L. Jones of Washington and enacted in 1920 following World War I, the law sought to build up a robust U.S. merchant fleet capable of supporting defense logistics and economic stability. Section 27 of the Act mandates that ships transporting goods between U.S. ports must be U.S.-built, U.S.-owned (by entities that are at least 75% U.S. citizen-controlled), U.S.-flagged, and at least 75% U.S.-crewed. These cabotage restrictions apply to the contiguous states and territories but exclude some outer possessions such as American Samoa. The Act also provides legal protections for merchant mariners and sets out provisions for maritime labor and injury recovery.

Joshua. NT. "Strengthening the Hanwha Philly Shipyard Amid Trump's Tariff Policy." *KEI (Korea Economic Institute in America) Blog: The Peninsula*, June 5, 2025. <https://keia.org/the-peninsula/strengthening-the-hanwha-philly-shipyard-amid-trumps-tariff-policies/>

10) Josh Smith, David Brunnstrom and Costas Pitas, "Trump says South Korea has approval to build nuclear-powered submarine", *Reuters*, October 30, 2025.

11) United States, *Merchant Marine Act of 1920 (Jones Act)*, Pub. L. No. 66-261, 41 Stat. 988 (1920).

The Jones Act effectively prohibits foreign-built or foreign-maintained vessels from domestic coastal trade, limiting collaboration with allied shipbuilders like those in South Korea¹²). Even limited refurbishments, reconstruction, or major modification performed in foreign shipyards may cause a vessel to lose its coastwise eligibility. Though justified as a national security measure, it raises domestic shipping costs and reduces opportunities for joint industrial projects.

- Byrnes-Tollefson Amendment (10 U.S.C. § 8679)¹³):

Representative Thor C. Tollefson first introduced the restriction within the 1965 Department of Defense Appropriations Act, barring the use of federal funds for constructing major hull sections abroad. Senator Robert C. Byrnes's follow-up in 1968 expanded the prohibition to entire naval vessels, later codified at 10 U.S.C. § 8679.

The law prohibits building hulls or major structural parts of U.S. Navy or Coast Guard ships in foreign shipyards. Congress enacted it to safeguard sensitive military designs and limit espionage risks. Although it allows foreign components (e.g., sensors, turbines), it requires hull construction and integration within U.S. territory. The restriction severely limits allied participation in U.S. naval production, hindering collaborative fabrication or submarine block-building¹⁴). South Korean shipyards—recognized globally for their quality—must limit cooperation to component manufacturing or technical assistance for vessels assembled in U.S. facilities. This maintains supply chain sovereignty but increases construction costs compared with allied nations.

12) <https://www.investopedia.com/terms/j/jonesact.asp>

13) United States, *Byrnes-Tollefson Amendment*, 10 U.S.C. § 8679 (1968).

14) <https://breakingdefense.com/2025/10/the-us-rok-test-case-can-visas-and-rules-unlock-american-shipbuilding/>

- International Traffic in Arms Regulations (ITAR)¹⁵:

This regulation is administered by the U.S. Department of State under Section 38 of the Arms Export Control Act of 1976, the International Traffic in Arms Regulations (22 C.F.R. §§ 120-130) evolved from Cold War-era controls on defense technology transfer.

ITAR governs exports, re-exports, and temporary imports of defense articles, services, and technical data listed on the U.S. Munitions List. It requires licenses for any sharing of controlled technical data—including design blueprints, propulsion systems, or combat system software—with foreign nationals, even if done for collaborative research. ITAR significantly constrains U.S.-South Korea shipbuilding partnerships, particularly in warship design, combat systems integration, or naval electronics. Licensing processes are time-intensive, and even modest joint projects require U.S. State Department approval, delaying co-development programs such as those involving HD Hyundai and Huntington Ingalls. These restrictions slow innovation but protect classified technology.

Major Legal Barriers

Name	Year	Primary restriction	Implication for foreing coopeation
Jones Act	1920	Cabotage must use U.S.-built, owned, and crewed ships	Excludes forign-built ships from dometic route
Byrnes-Tollefson Amendment	1982	Ban on foreing shipyards constructing Navy hulls	Blocks allied nations from defense vessel building
ITAR	1976	Control export of defense technologies	Slows or halts co-development projects
DoD Maintenance Rule	2025	Bars Navy ship repairs abroad	⌘Limits foreign MRO collaboration

15) United States, *International Traffic in Arms Regulations (ITAR)*, 22 C.F.R. §§ 120-130 (1976).

- Maintenance of Naval Vessels Regulation(2025)¹⁶⁾:

The Maintenance of Naval Vessels Regulation, U.S. Navy Instruction 3120.47A, was issued on January 15, 2025, by the U.S. Chief of Naval Operations. It establishes mandatory maintenance schedules and reporting standards under the Surface Ship Engineered Operating Cycle (SSEOC) program. The directive seeks to improve ship reliability, extend service life, and ensure centralized management by NAVSEA(Naval Sea Systems Command) and SURFMEPP(Surface Maintenance Engineering Planning Program)¹⁷⁾. It requires that all major maintenance and overhauls be performed at authorized U.S. facilities. This restriction effectively prevents foreign shipyards from engaging in U.S. Navy vessel maintenance due to national security and industrial protection policies. In specific, although South Korean shipyards has joined the MRO(Maintenance, Repair, and Overhaul) for U.S. warships, the regulation significantly narrows the operational role of South Korea by prohibiting most major and periodic maintenance activities and restricting engagement to emergency or minor repair cases.¹⁸⁾

These laws and regulations have been established underlying the two perspectives : protectionist foundations and national security rationals. Most U.S. maritime laws, such as the Merchant Marine Act of 1920 (Jones Act), were created to protect the domestic maritime industry from foreign competition. They require vessels involved in domestic commerce to be U.S.-built, U.S.-flagged, U.S.-owned, and U.S.-crewed. This legislation reflects a traditional protectionist philosophy—prioritizing national industrial base development and employment

16) U.S. Department of the Navy, *Maintenance of Naval Vessels Regulation (OPNAV Instruction 3120.47A)* (Washington, DC: Department of the Navy, 2025).

17) NAVSEA (Naval Sea Systems Command) is the U.S. Navy's largest systems command, responsible for the design, construction, maintenance, and modernization of all Navy ships and submarines for the U.S. Navy. SURFMEPP(Surface Maintenance Engineering Planning Program) is a specialized organization under NAVSEA, focusing specifically on surface ships (not submarines). Its job is to develop and manage the standard maintenance requirements, engineering standards, life-cycle maintenance schedules, and planning documents for all Navy surface ships.

18) *Naval News*, "Hanwha Ocean completed its first MRO on US Navy ship", March 13, 2025. <https://www.navalnews.com/naval-news/2025/03/hanwha-ocean-completed-its-first-mro-on-us-navy-ship/>

over international efficiency or collaboration. Consequently, even allied shipbuilders cannot construct vessels meant for intra-U.S. commerce.

Laws such as the Byrnes-Tollefson Amendment (10 U.S.C. § 8679) explicitly tie construction and maintenance restrictions to national defense concerns. It forbids foreign shipyards from building U.S. Navy hulls or major components, aiming to prevent industrial espionage, technology leakage, and dependency on foreign suppliers. For example, even though South Korean Shipyards such as Hyundai Heavy Industry and Hanwha Ocean are willing to build American warship in their yards with less time and budgets, it is hindered by these laws in effective.

5. Soften Major Legal Barriers Hindering Foreign Companies from Entering the U.S. Shipbuilding Market

Although several laws still restrict foreign participation in the U.S. shipbuilding industry, recent legislative bills have been introduced to encourage and support greater foreign engagement. This study highlights four key bills frequently covered in media and research that seek to ease these restrictions while balancing national security concerns.

- Merchant Marine Allies Partnership Act (H.R. 4839, 2025)¹⁹:
This act is introduced in 2025 by Representatives Ed Case (Democrat-Hawaii) and James Moylan (Republican-Guam), motivated by bipartisan support from Pacific states and territories dependent on maritime trade²⁰. This bill partially relaxes the Jones Act by establishing a Foreign Ally Shipping Registry including South Korea, Japan, and the Philippines. The key provisions remove the 50% excise tax on major repairs when U.S. ship operators use shipyards in allied countries, and they allow foreign-built vessels from those allies to participate in U.S. coastwise trade, provided they meet specific regulatory requirements.

19) U.S. Congress, *Merchant Marine Allies Partnership Act*, H.R. 4839, 118th Cong. (2025).

20) <https://natlawreview.com/article/ships-america-act-launched-congress>

It authorizes the Department of Transportation to issue renewable 5-year licenses for qualified ally-built vessels.

It represents the most direct attempt by Congress to ease cabotage rules without repealing them entirely, promoting deeper industrial cooperation and trade integration with allied maritime nations—especially South Korea and Japan—by granting limited access for certain allied vessels to operate on U.S. domestic maritime routes.

- Partner With Korea Act (2025)²¹⁾:

This act is introduced in the U.S. House of Representatives by Young Kim (Republican-California) on July 23, 2025. A joint U.S.-Korean business-backed initiative launched in 2025, supported by government and industry leaders on both sides. While not amending maritime law, this act creates a new visa category and regulatory framework that facilitates Korean investment in U.S. strategic industries, especially in shipbuilding and defense manufacturing. It expedites visa processing for Korean engineers and managers, eases CFIUS(Committee on Foreign Investment in the United States)²²⁾ reviews for firms from U.S. treaty allies, and promotes joint naval and commercial shipbuilding projects under government-to-government agreements.

Therefore, it enhances cooperation by removing administrative barriers to Korean investment and workforce mobility in U.S. shipbuilding and defense sectors, fostering deeper industrial partnerships within a controlled and secure policy environment.²³⁾

21) U.S. Congress, *Partner With Korea Act*, 118th Cong. (2025).

22) CFIUS(Committee on Foreign Investment in the United States) in the United States, reviews foreign investments to ensure they do not pose national-security risks.

23) <https://www.trade.gov/country-commercial-guides/south-korea-defense-industry-equipment>

- SHIPS for America Act (S. 1541 / H.R. 3940, 2025)²⁴:
Championed in 2025 by Senators Mark Kelly (Democrat-Arizona) and Todd Young (Republican-Indiana), this bipartisan initiative aims to revitalize the U.S. shipbuilding industry while responsibly expanding collaboration with allied nations. The bill strengthens the U.S. shipbuilding base yet recognizes the strategic value of foreign allied partnerships by permitting allied shipyards to co-produce dual-use and commercial vessels.
It also directs a study on easing ITAR export controls for foreign-owned maritime companies, establishes an international exchange program for naval architects and mariners, and supports joint research and development on Arctic and green ship technologies. Overall, the measure balances national-defense priorities with industrial cooperation by creating new pathways for allied firms—including South Korean companies—to participate in U.S. ship production and technology exchange, signaling a modernization of long-standing restrictions that have limited collaboration²⁵).

Major Soften Laws

Name	Year	Major contents	Implication for foreing coopeation
Merchant Marine Allies Partnership Act	2025	Creates Foreign Ally Shipping Registry; exempts excise tax on allied repairs; allows licensed foreign-built vessels in U.S. coastwise trade	Allows allied vessels partial access to U.S. domestic trade routes
Partner With Korea Act	2025	New visa category and easier investment rules for Korean firms; promotes joint shipbuilding projects	Removes barriers for Korean investment and skilled workers in U.S. shipbuilding
SHIPS for America Act	2025	Incentives for U.S. shipbuilding; allows allied co-production; studies easing export controls; promotes joint R&D and exchanges	Opens paths for allied firms including South Korea to participate in U.S. shipbuilding
Open America's Waters Act	2025	Full repeal of Jones Act cabotage rules allowing foreign-built and foreign-crewed ships in U.S. routes	πWould fully open U.S. domestic shipping to foreign competition, expanding cooperation opportunities but politically contested

24) U.S. Congress, *SHIPS for America Act*, S. 1541 / H.R. 3940, 118th Cong. (2025).

25) <https://natlawreview.com/article/ships-america-act-launched-congress>

- Open America's Waters Act (H.R. 3940, 2025)²⁶⁾:

Introduced in the U.S. House of Representatives by Tom McClintock (Republican-California) on June 12, 2025, amid broader debates over maritime policy modernization, the bill is supported by open-trade advocates but strongly opposed by maritime unions. It proposes a full repeal of key Jones Act cabotage provisions, allowing foreign-built and foreign-crewed vessels unrestricted access to U.S. domestic coastal routes.

If enacted, it would represent a significant shift by fully opening U.S. domestic shipping to foreign competition. While it would immediately expand opportunities for collaboration with allied shipbuilders and commercial operators, it has also generated substantial political controversy, particularly regarding national security implications and labor protection concerns²⁷⁾.

6. Overview

The legislative landscape in 2025 shows a growing effort in Congress to modernize U.S. shipbuilding and maritime trade policies through a range of bills with varying approaches and political momentum.²⁸⁾

The fastest-moving bill, the SHIPS for America Act (S. 1541), has cleared committee and is likely to be up for a Senate vote before the end of 2025. This bipartisan legislation, sponsored by Senators Mark Kelly and Todd Young among others, aims to revitalize U.S. maritime competitiveness by providing financial incentives, cargo preference mandates, and workforce development programs, while allowing some allied cooperation through joint ventures and technology sharing. It proposes expanding the U.S.-flag international fleet and strengthening the shipyard industrial base to better compete globally, especially against China. The bill has widespread cosponsorship and strong support from industry groups but is currently pending

26) U.S. Congress, *Open America's Waters Act*, H.R. 3940, 118th Cong. (2025).

27) <https://natlawreview.com/article/ships-america-act-launched-congress>

28) <https://natlawreview.com/article/update-ships-america-act>

further floor action.

The most diplomatically significant bill is the Partner With Korea Act, which integrates shipbuilding cooperation into broader trade and visa reforms. It facilitates Korean investment in U.S. strategic industries, expedites visa and work permit processing for Korean engineers and managers, and promotes joint naval and commercial shipbuilding projects through government-to-government agreements. While it does not amend maritime law directly, it removes regulatory and workforce barriers crucial to Korea-U.S. industrial collaboration.

The most transformative yet politically contested legislation is the Open America's Waters Act (H.R. 3940), which seeks to repeal key Jones Act cabotage provisions, allowing foreign-built and foreign-crewed ships to operate freely in U.S. coastal trade. This radical reform faces strong opposition from maritime labor unions and domestic industries concerned about national security and economic impacts and currently lacks significant political momentum.

Practical regional reform is represented by the Merchant Marine Allies Partnership Act (H.R. 4839), which carves out limited exemptions without overhauling the Jones Act framework. It introduces a Foreign Ally Shipping Registry including allied countries like South Korea and Japan, exempts U.S. ship operators from certain excise taxes on repairs in allied shipyards, and permits qualified foreign-built vessels to engage in coastwise trade under licenses. This bill enjoys support from trade-dependent Pacific states and territories seeking pragmatic cooperation expansion. Additional regional relief through the Noncontiguous Shipping Relief Act tests limited exemptions with potential for broader application in the future.²⁹⁾

Collectively, these bills reflect a growing congressional recognition that existing U.S. shipbuilding legal barriers require modernization to facilitate strategic allied industrial collaboration while preserving national security interests. They illustrate a spectrum of reform from incremental carve-outs and regulatory easements to ambitious revitalization efforts and radical deregulation proposals. Balancing alliance

29) <https://natlawreview.com/article/ships-america-act-launched-congress>

cooperation goals with domestic political sensitivities remains the overarching challenge guiding this legislative momentum in U.S. maritime policy.³⁰⁾

7. Policy Recommendations

Policy recommendations can be divided into two levels: political and industry-specific. Political-level recommendations focus on overcoming legal and regulatory barriers, while industry-level recommendations address strategies within the shipbuilding sector to adapt to or mitigate these constraints.

At the political level, two key approaches are proposed. First, put collaborative efforts when MASGA project into practice. Fortunately, last October, South Korea government and the U.S. government have reached at the final deal of tariff negotiations, lingered over five months³¹⁾. Hence, the two governments invest commitments for moving the deal forward for substantive fruits. For example, it is good for forming a directive organization that control and manage the shipbuilding between the White House and Blue House.

Second, the U.S. government and Congress, along with South Korean officials and companies, should work diligently to pass relevant legislation—such as the Partner With Korea Act—to facilitate and accelerate this partnership.

The following recommendations concern the shipbuilding industry itself. First of all, *Joint Ventures and U.S.-Based Production* are one of the solution. Korean and Japanese firms have invested in or partnered with U.S.-based shipyards to satisfy Jones Act and Byrnes-Tollefson requirements that hull construction and vessel assembly occur in the U.S. For example, Hanwha Ocean's acquisition of the Philly Shipyard enables Korean designs and parts to be integrated in U.S. builds, thus preserving aligned industrial activity while respecting domestic shipbuilding

30) <https://insidedefense.com/daily-news/ships-act-hung-senate-commerce-committee-lawmakers-say>

31) *New York Times*, "South Korea Says U.S. Agreed to Lower Tariffs and to Ease Investment Terms", October 29, 2025.
<https://www.nytimes.com/2025/10/29/us/politics/tariff-trump-south-korea-trade.html>

mandates.

Secondly, *Modular Construction and Component Sharing* are feasible under the existing laws. Allied partners focus on producing modular ship components, propulsion systems, electronics, and advanced materials in their home countries for shipment to U.S. yards. This approach complies with restrictions on foreign hull fabrication while allowing specialized expertise and technology transfer.

8. Conclusion

Revitalizing the shipbuilding industry is crucial for the U.S. to compete successfully against China. South Korea is a suitable partner to support and strengthen America's shipbuilding capabilities. However, significant legal barriers and regulations have historically limited foreign investment in U.S. shipyards, including longstanding laws and regulations dating back to 1920 designed to protect and promote the domestic shipbuilding sector by restricting foreign involvement.

The U.S. government now recognizes the challenges facing the domestic shipbuilding industry and is eager to restore its global competitiveness, especially in light of China's maritime expansion. Since the inauguration of the current Trump administration, Congress has introduced several key laws aiming to encourage and attract foreign investment, particularly from allies like South Korea. This study proposes both policy recommendation of political and industrial frameworks to address these legal barriers and foster enhanced U.S.-South Korea collaboration in shipbuilding. Then, this study would contribute to enhance shipbuilding cooperation between South Korea and the U.S.

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Maritime MRO in the South Korea-U.S. Alliance Under the Second Trump Administration

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I. INTRODUCTION

Kuyoun Chung

The shifting balance of naval power between the United States and China has elevated maritime industrial capacity—especially shipbuilding and sustainment—to the forefront of Indo-Pacific strategy. China’s shipbuilding output now exceeds that of the United States by orders of magnitude, generating a structural asymmetry that threatens U.S. naval primacy and constrains operational flexibility. At the same time, the U.S. shipbuilding and repair sector faces structural impediments: obsolescent infrastructure, workforce shortages, and prolonged maintenance delays that renders major naval assets non-operational for months or even years. These industrial limitations have become so severe that Washington increasingly seeks to leverage allied capacity to offset domestic shortfalls, a trend reflected in successive U.S. initiatives such as the National Defense Industrial Strategy,¹⁾ Maritime Statecraft,²⁾ and more recently the *Make American Shipbuilding Great Again (MASGA)* initiative.³⁾ In this context, South Korea—home to the world’s most competitive commercial and naval shipyards—has emerged as a pivotal partner. South Korean firms such as HD Hyundai Heavy Industries and Hanwha Ocean have already conducted major overhauls of U.S. naval auxiliary vessels, demonstrating that the ROK’s industrial base can reduce turnaround delays and strengthen the resilience of regional sustainment networks.

Against this backdrop, the ROK-U.S. alliance is undergoing an important, though underexamined, industrial transformation. Maintenance, repair, and overhaul (MRO) cooperation is no longer a purely logistical matter but a strategic instrument for

1) US Department of War, “DOD Releases First Defense Industrial Strategy,” January 12, 2024. <https://www.war.gov/News/News-Stories/Article/Article/3644527/dod-releases-first-defense-industrial-strategy/>

2) US Navy, “SECNAV Del Toro Calls for a New, Bold Maritime Statecraft in Era of Intense Strategic Competition,” September 26, 2023. <https://www.navy.mil/Press-Office/Press-Releases/display-pressreleases/Article/3539151/secnav-del-toro-calls-for-a-new-bold-maritime-statecraft-in-era-of-intense-stra/>

3) Jihoon Yu, “How South Korea’s MASGA’ Proposal Could Reshape US Shipbuilding” *The Diplomat* (August 14, 2025) <https://thediplomat.com/2025/08/how-south-koreas-masga-proposal-could-reshape-us-shipbuilding/>

coping with China's rise and revitalizing U.S. maritime power. Yet it also exposes political-economic frictions: U.S. domestic defense contractors view sustainment as a high-margin sector and therefore resist offshoring maintenance work, while U.S. Congress maintains regulatory barriers such as International Traffic in Arms Regulations (ITAR) restrictions and legal limits on foreign shipyard repair. South Korea, for its part, sees MRO cooperation not only as burden-sharing but as a pathway toward industrial upgrading, deeper alliance cooperation, and long-term defense-technological autonomy. These dynamics illustrate the dual nature of MRO cooperation: it strengthens allied resilience but is simultaneously conditioned by political, economic, and institutional constraints on both sides.

This study is therefore motivated by a central research question: *What strategies can be employed to enhance alliance resilience through ROK-U.S. MRO cooperation?*

To address this question, the analysis focuses on the concept of alliance resilience, defined as the ability of an alliance to maintain credible deterrence, operational readiness, and political cohesion under strategic and industrial stress.⁴⁾ Examining the ROK-U.S. alliance through the lens of industrial capacity reveals that resilience is shaped not only by strategic alignment but also by the geography of production and repair—where ships are built, sustained, and modernized. Understanding how to strengthen alliance resilience requires examining factors that enhance cooperation—such as South Korea's industrial scale, proximity, and cost efficiency—as well as factors that constrain it, including U.S. congressional preferences, regulatory barriers, protectionist political economy dynamics, and South Korea's demographic or strategic vulnerabilities.

To systematically analyze these drivers and obstacles, this book integrates both strategic and domestic political-economic considerations. At the international level, the study examines how China's maritime expansion, Indo-Pacific contested logistics, and shifting U.S. global posture create demand for deeper industrial cooperation. At the domestic level, it evaluates how congressional politics, industry

4) NATO, "Resilience, civil preparedness and Article 3" (November 13, 2024). <https://www.nato.int/en/what-we-do/deterrence-and-defence/resilience-civil-preparedness-and-article-3>

lobbying, regulatory structures, and South Korea's own industrial policy shape the feasibility and durability of cooperative arrangements. This two-level approach allows for a multi-dimensional assessment of alliance resilience:

- Factors that contribute to alliance resilience include South Korea's shipbuilding scale, forward MRO capacity, industrial-technological complementarities, and the emerging alignment between U.S. industrial strategy and South Korean capabilities.
- Factors that hinder alliance resilience include U.S. regulatory constraints (ITAR, Byrnes-Tollefson Amendment), industry resistance to value offshoring, congressional skepticism, South Korean demographic decline, and strategic vulnerabilities to Chinese and North Korean threats.
- Balancing constraints and opportunities requires identifying pathways—such as phased MRO expansion, regulatory reform, co-investment frameworks, and institutionalized industrial cooperation—that align incentives at both the strategic and domestic levels.

By analyzing these intersecting pressures, this introduction situates shipbuilding and MRO cooperation as a critical but politically contested foundation of future ROK-U.S. alliance resilience. The chapters that follow build on this logic to show how industrial integration is becoming a central arena in alliance management—where political economy, maritime strategy, and technological capability converge to shape the future of deterrence and regional security. Furthermore, this study grounds its analytical framework in two detailed empirical cases. Chapter 3 examines Japan's evolving role as a forward sustainment hub—highlighting how geography, industrial depth, and U.S.-Japan institutional coordination shapes the competitive landscape for regional MRO cooperation. Chapter 4 then turns to South Korea's shipbuilding and MRO ecosystem, demonstrating how South Korean shipyards have emerged as credible alternatives—and in some domains, superior options—to support U.S. naval repair and sustainment needs in the Indo-Pacific. The conclusion offers policy recommendations on how ROK-U.S. cooperation in MRO can be leveraged to strengthen the resilience of the alliance. Together, these cases provide comparative insights into how allied industrial capabilities can enhance, constrain, or reshape the resilience of U.S.-led maritime architectures in the region.

II. ROK-U.S. MRO Cooperation and the Political Economy of Alliance Industrial Policy

Darcie Draudt-Véjares

1. Introduction

Maintenance, repair, and overhaul (MRO) cooperation between the United States and South Korea is often framed as a narrow logistical task—but in reality, it represents a strategically overlooked dimension of alliance management. Military planners in both countries recognize the strategic benefits: South Korean shipyards can maintain U.S. Navy vessels more efficiently, more cost-effectively, and closer to theater than American facilities, while South Korean excellence in defense capabilities offers opportunities across multiple domains. Yet despite clear operational logic and high-level political support from multiple administrations, MRO cooperation remains limited to a handful of naval contracts.

This chapter argues that ROK-U.S. MRO cooperation illustrates an emerging form of *alliance industrial policy*: routine sustainment that reallocates where value is created, embeds cross-border standards, and incrementally transforms the alliance's economic base. What appears a logistical issue is in fact industrial policy in practice—shaped by decisions over production location, value distribution, technology transfer, and long-term business ties.

Yet efforts to scale this cooperation beyond limited naval contracts expose a core tension between the strategic logic driving U.S. interest in allied capacity and South Korea's pursuit of industrial upgrading within the alliance—each shaped by domestic political economy constraints that complicate implementation. The United States seeks to leverage South Korean industrial capacity to address readiness shortfalls while maintaining strategic control, while South Korea treats MRO as a strategic opportunity to enhance its alliance role through expanded defense market access and technology transfer. These divergent objectives, layered atop regulatory barriers and shifting strategic priorities, reframe MRO cooperation as a contested site of industrial policy—highlighting enduring frictions over value capture, regulatory gatekeeping, and the governance of industrial gains within the alliance.

2. The U.S. Perspective: MRO as Strategic Capacity Supplement

From Washington's perspective, the appeal of South Korean MRO cooperation lies in its ability to supplement overstretched domestic capacity. Yet this logic—grounded in operational necessity—is often at odds with entrenched industrial interests and political constraints. What appears militarily rational at the Pentagon can register as economically threatening in Congress or industry. Understanding this tension is key to explaining why ROK-U.S. MRO cooperation remains limited despite high-level endorsement.

Ally contributions to U.S. MRO capabilities address two critical strategic challenges. First, American defense production across all domains faces severe capacity constraints. The U.S. naval shipbuilding industry exemplifies these limitations: a U.S. shipbuilding and repair sector with total annual revenues of approximately \$27.9 billion in 2019, according to the U.S. Maritime Administration.⁵⁾ Industry analysts estimate that the naval maintenance, repair, and overhaul (MRO) segment alone accounts for roughly \$20 billion annually.⁶⁾ In 2021, the Army and Air Force reported that operating and support accounts for more than 70 percent of a weapon system's total lifecycle costs, making aftermarket maintenance and support services highly profitable revenue streams for sustained income over many years.⁷⁾

China's massive shipbuilding industrial capacity intensifies the strategic urgency. According to the Center for Strategic and International Studies, China's shipbuilding output now exceeds the entire U.S. shipbuilding industry's cumulative production since World War II.⁸⁾ Multiple assessments find China's commercial and naval

5) U.S. Maritime Administration, *The Economic Contributions of the U.S. Shipbuilding and Repairing Industry* (Washington, DC: U.S. Department of Transportation, June 2021), 3, <https://www.maritime.dot.gov/sites/marad.dot.gov/files/2021-06/Economic%20Contributions%20of%20U.S.%20Shipbuilding%20and%20Repairing%20Industry.pdf>.

6) Naval News, "South Korea's HD HHI Inks MRO Agreement with the U.S. Navy," July 2024, <https://www.navalnews.com/naval-news/2024/07/south-koreas-hd-hhi-inks-mro-agreement-with-the-us-navy/>.

7) U.S. Government Accountability Office, "Weapon System Sustainment: The Army and Air Force Conducted Reviews; the Army Identified Operating and Support Cost Growth," GAO-20-390, Page 1, April 2020, <https://www.gao.gov/products/gao-23-106341>.

shipbuilding output vastly exceeds U.S. capacity, underscoring a pronounced scale asymmetry.⁹⁾ For every one oceangoing vessel that the U.S. can produce, China can produce 359 in one single year.¹⁰⁾

U.S. forward MRO capabilities for certain essential platforms remain limited in the Indo-Pacific, leading to delays in turnarounds and maintenance bottlenecks for deployed units. The U.S. Government Accountability Office (GAO) reports that the F-35 sustainment enterprise continues to face “depot-maintenance delays, component repair backlogs, and readiness shortfalls.”¹¹⁾ In-theater repair capabilities help avoid costly transit back to the U.S. mainland, minimize exposure to attack during transit, and return systems to the field faster—enhancing readiness and operational flexibility.¹²⁾ Similarly, Army ground systems often rely on U.S.-based depots, creating costly delays and constraining operational tempo. GAO reporting indicates steep declines in major overhauls at Army depots over the past decade, with impacts acknowledged on mission-capable rates across multiple vehicle platforms.¹³⁾ These limitations highlight the value of allied, in-theater MRO options that can sustain readiness without strategic lift or base access vulnerabilities.¹⁴⁾

8) Matthew P. Funaiolo, “The Threat of China’s Shipbuilding Empire,” Center for Strategic and International Studies, April 2024, <https://www.csis.org/analysis/threat-chinas-shipbuilding-empire>.

9) Alliance for American Manufacturing, “China’s Shipbuilding Capacity is 232 Times Greater Than That of the United States,” February 2024, <https://www.americanmanufacturing.org/blog/chinas-shipbuilding-capacity-is-232-times-greater-than-that-of-the-united-states/>.

10) Naval News, “China Produces 359 Ships Per Year Compared to One for the U.S.,” July 2024, <https://www.navalnews.com/naval-news/2024/07/china-produces-359-ships-annually-compared-to-one-in-the-u-s/>.

11) U.S. Government Accountability Office, “F-35 Aircraft Sustainment: DOD Needs to Address Substantial Supply Chain Challenges,” GAO-23-105341, April 2023, <https://www.gao.gov/assets/gao-23-105341.pdf>.

12) Cynthia R. Cook, Nicholas Szechenyi, Henry H. Carroll, Audrey Aldisert, Sarah Hendrick, and Javier Nater, *Enabling Forward Sustainment: Japanese Industry’s Potential Role in U.S. Airpower Readiness* (Washington, DC: Center for Strategic and International Studies, June 2025), https://csis-website-prod.s3.amazonaws.com/s3fs-public/2025-06/250625_Cook_Forward_Sustainment_1.pdf?VersionId=TTwH9eEMXoWeDaBqE.5VkzqMoCe_.kQW

13) U.S. Government Accountability Office, *Weapon System Sustainment: Various Challenges Affect Ground Vehicles’ Availability for Missions*, GAO-25-108679, September 25, 2025, p. 20-21, <https://www.gao.gov/assets/gao-25-108679.pdf>

Second, the Indo-Pacific strategic environment increasingly depends on distributed maintenance and logistics networks capable of supporting forward-deployed assets across all domains. According to the Congressional Research Service, the U.S. military's evolving posture in the region emphasizes dispersed sustainment nodes and partner-based repair facilities to strengthen resilience against contested logistics environments.¹⁵⁾ RAND researchers similarly note that multinational and allied maintenance capabilities are critical for sustaining operations across extended distances and under potential denial conditions.¹⁶⁾

The Pentagon released its first-ever National Defense Industrial Strategy in January 2024, which explicitly calls for modernized defense ecosystems incorporating government-industry-allied cooperation.¹⁷⁾ During the Biden administration (2020-2024), Secretary Carlos Del Toro's Maritime Statecraft vision emphasizes partnerships with "the most advanced shipbuilders in the world"—which included a clear reference to South Korean capabilities.¹⁸⁾ The focus on industrial alliances continues in the second Trump administration since coming into office in January 2025. The White House's Make American Shipbuilding Great Again (MASGA) initiative signals executive-level support for deeper industrial integration with key allies.

In the U.S. Congress, developments further demonstrate this shift: Senators Mike Lee and John Curtis introduced the "Ensuring Naval Readiness Act" in February 2025,

14) Assistant Secretary of Defense for Sustainment Christopher J. Lowman and Deputy Assistant Secretary Steve Morani, "Media Roundtable on Defense Sustainment and Industrial Base Strategy," U.S. Department of Defense, June 25, 2024, <https://www.defense.gov/News/Transcripts/Transcript/Article/3845394/assistant-secretary-of-defense-for-sustainment-christopher-j-lowman-and-deputy/>.

15) Emma Chanlett-Avery and Caitlin Campbell, *U.S. Defense Infrastructure in the Indo-Pacific* (CRS Report R47589, Washington, DC: Congressional Research Service, June 6, 2023).

16) Derek Eaton, Timothy Bonds, and Jennifer Moroney, *Sustaining U.S. Army Operations in the Indo-Pacific* (Santa Monica, CA: RAND Arroyo Center, RAND Corporation, 2025).

17) U.S. Department of Defense, *National Defense Industrial Strategy* (Washington, DC: Department of Defense, January 2024). <https://www.defense.gov/News/Releases/Release/Article/3643326/dod-releases-first-ever-national-defense-industrial-strategy/>

18) Carlos Del Toro, "Secretary of the Navy Carlos Del Toro Delivers Remarks at Harvard Kennedy School," *U.S. Navy*, October 3, 2023, <https://www.navy.mil/Press-Office/Speeches/display-speech/Article/3538420/secnav-delivers-remarks-at-harvard-kennedy-school/>

which would “authorize an exception to the prohibition on the construction of naval vessels in foreign shipyards” by allowing the Navy to construct vessels “in a foreign shipyard if the shipyard is located in a NATO member country or in an Indo-Pacific country with which the U.S. has a current mutual defense agreement” and “the cost is cheaper in such shipyard than it would otherwise be in a domestic shipyard.”¹⁹⁾

However, this industrial strategic logic confronts systematic domestic resistance rooted in the structure of American defense contracting. United States Government Accountability Office (GAO) analyses indicate that roughly seventy percent of a weapon system’s total life-cycle expenses stem from sustainment activities, and that maintenance and support services represent one of the most reliable sources of long-term revenue for defense contractors.²⁰⁾ External industry analysts note that maintenance and aftermarket support constitute a particularly profitable segment of the defense industry because contractors can sole-source spare parts at negotiated prices, charge for upgrades, and thereby create a form of vendor lock that gives suppliers significant pricing power.²¹⁾

This creates a structural contradiction: the same capacity constraints that make South Korean MRO cooperation strategically attractive also make it economically threatening to established contractors. The Department of Defense’s own *Contract Finance Study Report* from April 2023 shows that defense contractor operating margins rose from the mid-single digits to the low double digits over two decades,²²⁾

19) U.S. Congress. “S. 406 — Ensuring Naval Readiness Act.” 119th Cong., 1st Sess., introduced January 24, 2025. Library of Congress, Congress.gov. Accessed November 10, 2025. <https://www.congress.gov/bill/119th-congress/senate-bill/406>

20) United States Government Accountability Office (GAO), *Weapon System Sustainment: DOD Identified Operating and Support Cost Growth but Needs to Improve the Consistency and Completeness of Information to Congress*, GAO-24-107378 (Washington, D.C.: Government Accountability Office, 2024), 4, <https://www.gao.gov/assets/gao-24-107378.pdf>

21) Umbrex, “*How the Defense Contractor Industry Works*,” accessed November 10, 2025, <https://umbrex.com/resources/how-industries-work/aerospace-defense/how-the-defense-contractor-s-manufacturing-industry-works/>.

22) Department of Defense, *Contract Finance Study* (Washington, D.C.: Office of the Under Secretary of Defense for Acquisition and Sustainment Defense Pricing and Contracting, April 2023), 21, <https://www.acq.osd.mil/asda/dpc/pcf/docs/finance-study/FINAL%20-%20Defense%20Contract%20Finance%20Study%20Report%204.6.23.pdf>.

and external analyses increasingly identify sustainment and aftermarket services as major contributors to margin stability and growth.²³⁾ In this sense, domestic commercial incentives undercut strategic objectives, as the U.S. defense industrial base's interest in sustainment revenue could serve as a political-economic damper on conversations toward deeper defense industrial cooperation. These tensions suggest that industrial interests, not only strategic logic, shape where and how allied sustainment cooperation advances—a pattern classic to political-economy analysis of defense industries.

The U.S. regulatory framework compounds these challenges. Defense maintenance requires compliance with the International Traffic in Arms Regulations (ITAR), which define sustainment activities and set limits on cross-border repair or overhaul.²² Under ITAR (C.F.R. §§ 120.45, 123.4, 124.3), allied maintenance work may include inspection or repair but generally excludes performance-enhancing modifications—effectively shaping the scope of allied MRO collaboration.²⁴⁾

The United States requires security clearances for personnel and facilities involved in maintenance or overhaul of classified systems, with additional safeguarding and facility-control measures to protect sensitive information.²⁵⁾ Under the National Industrial Security Program, allied MRO providers performing sustainment or overhaul work on U.S. defense systems that involve classified information must obtain facility clearances, designate vetted personnel, and implement compliance programs aligned with U.S. standards for classified work.²⁶⁾ In practice, these legal obligations

23) McKinsey & Company, “How Aerospace and Defense Players Can Win in Aftermarket Services,” *McKinsey & Company*, April 2022, 2-3, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/how-aerospace-and-defense-players-can-win-in-aftermarket-services>.

24) U.S. Department of State, *International Traffic in Arms Regulations*, 22 C.F.R. §§120.45, 123.4, and 124.3 (Washington, D.C.: U.S. Government Publishing Office, current through 2025), <https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M>.

25) Defense Counterintelligence and Security Agency. “Facility Clearances (FCL).” Washington, DC. Accessed November 10, 2025. <https://www.dcsa.mil/FCL/Maintaining-Personnel-Security-Clearances/>.

26) U.S. Code of Federal Regulations. Title 32, Section 117.19. *National Industrial Security Program Operating Manual (NISPOM)*. Washington, DC: Government Publishing Office. U.S. Department of Defense. *Instructions for DD Form 254*. Washington, DC. Accessed November 10, 2025. <https://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd0254-Inst.pdf>.

can add steps that reduce some of the cost and efficiency advantages allies typically achieve through co-located commercial and dual-use manufacturing.

The logic of expanded allied industrial integration appears increasingly strained as alliance management and defense-industrial coordination come under renewed political and strategic scrutiny. Debates inside Washington about prioritizing homeland and Western Hemisphere defense over Indo-Pacific commitments have intensified, raising questions about the future demand for forward sustainment.²⁷⁾ Current debates in Washington's strategic community over whether the United States can sustain a multi-theater defense posture further challenge the rationale for South Korean MRO cooperation, as growing voices call for re-centering U.S. focus on the Western Hemisphere and continental defense.²⁸⁾ Alternatively, a U.S. rebalance toward the Americas—without a full retrenchment from Asia—could bolster the rationale for relying on key regional allies such as South Korea to maintain forward sustainment capacity.

For South Korean MRO cooperation, this strategic reorientation creates particularly acute complications. The original operational case—Pacific theater proximity and Chinese capacity competition—loses urgency when Pentagon priorities shift toward Latin America and homeland defense. South Korean investments in U.S.-oriented MRO capabilities could become stranded assets if strategic priorities fundamentally change. Yet this moment of uncertainty also underscores the analytical core of alliance industrial policy: that cooperation in areas like MRO is not simply a function of defense logistics, but a test of how far the alliance's industrial and strategic integration can adapt to shifting geopolitical logics.

27) Carla Babb, "New Pentagon Strategy to Focus on Homeland, Western Hemisphere," *Defense News*, September 25, 2025, <https://www.defensenews.com/pentagon/2025/09/25/new-pentagon-strategy-to-focus-on-homeland-western-hemisphere/>

28) Meghann Myers, "New National Security Strategy Could Redefine Homeland Defense, Experts Say," *Defense One*, October 23, 2025, <https://www.defenseone.com/policy/2025/10/new-national-security-strategy-could-redefine-homeland-defense-experts/409024/>

3. The ROK Perspective: MRO as Alliance Upgrading Strategy

Where Washington views MRO as capacity supplementation, Seoul sees it as industrial upgrading within the alliance framework—a proactive, not reactive, strategy. Whereas the United States seeks to leverage allied industrial capacity to address readiness shortfalls while maintaining strategic control, South Korean policymakers treat MRO collaboration as a deliberate form of alliance industrial policy—a mechanism for economic upgrading and industrial integration within the alliance framework. Many government officials and alliance experts view current MRO contracts not as end goals but as strategic investments that reposition South Korea from a dependent security partner into a co-producing industrial and technological ally.²⁹⁾

South Korea's MRO cooperation builds on clear comparative advantages, especially in naval systems where its world-class shipbuilding sector enables partnership rather than subordination. The ROK government's goal to develop medium-sized shipyards for U.S. Navy MRO work has now taken shape through the November 2025 partnership between Huntington Ingalls Industries and HD Hyundai, expanding U.S.-Korea shipbuilding and maintenance cooperation.³⁰⁾ South Korean officials have highlighted K Shipbuilding, HJ Heavy Industries, and HD Hyundai Gunsan as candidate shipyards for U.S. Navy MRO operations, and the new partnership advances that agenda.³¹⁾ The initiative envisions starting with maintenance contracts and later expanding to shipbuilding once U.S. legal barriers ease—a sequencing that illustrates South Korea's stepwise approach to industrial policy, using MRO as a measured step toward broader defense industrial participation within the alliance.

29) Author notes, Seoul and Daejeon, September 8-12, 2025.

30) Wilson, Alex. "Largest Shipbuilders in US, South Korea Agree to 'Deeper Collaboration.'" *Stars and Stripes*, October 29, 2025. Accessed November 10, 2025. https://www.stripes.com/theaters/asia_pacific/2025-10-29/shipbuilding-military-commercial-south-korea-19583434.html

31) Kim Nam-hui and Yi In-a. "Han-Mi hyeopnyeok jeonyong joseonso huboro HJ Jung•Keijoseon georon" [HJ Heavy Industries and K Shipbuilding Mentioned as Candidates for Korea-U.S. Cooperation-Exclusive Shipyard]. *Biz Chosun*, August 11, 2025. <https://biz.chosun.com/industry/company/2025/08/11/XCNCWKPYBPBF5FMIUSHKPQ5IEEQ/>

At the corporate level, South Korean defense conglomerates carry this strategy forward in practice. HD Hyundai's securing of the first major U.S. Navy MRO contract for the USNS Alan Shepard in August 2025,³²⁾ and Hanwha Ocean's completion of work on the USNS Charles Drew and Wally Schirra,³³⁾ demonstrate how firm-level actions advance national objectives. While South Korean firms also pursue aerospace and ground-system sustainment—such as the ROKAF F-35 MRO depot³⁴⁾ and Hanwha's helicopter overhaul projects³⁵⁾—these remain well-positioned within defense industrial priorities, where shipbuilding excellence provides market entry and may contribute to shaping alliance industrial interdependence, highlighting potential influence rather than asserting definitive leverage.

Recent U.S. legislative changes have further reinforced these prospects. The Ensuring Naval Readiness Act seeks to address “the critical shortfall in [U.S.] naval forces”³⁶⁾ and cites the Navy's force-structure goal of reaching a 355-ship fleet.³⁷⁾ To meet these goals, the proposed legislation underscores the U.S. need for expanded maintenance capacity. The legislation marks the first significant revision to the Byrnes-Tollefson Amendment since 1965, signaling the potential end of six decades of protectionist restrictions and a turning point for alliance industrial integration. Markets have recognized the opportunity: shares in HD Hyundai Heavy Industries

32) Kan, Hyeong-woo. “HD Hyundai Heavy Industries Secures First U.S. Navy MRO Contract for USNS Alan Shepard (T-AKE 3).” *The Korea Herald*, August 6, 2025. <https://www.koreaherald.com/article/10548288>

33) Fontana, Grady T. “USNS Wally Schirra Completes Major Maintenance at South Korean Shipyard.” *U.S. Navy Press Release*, March 13, 2025. <https://www.navy.mil/Press-Office/News-Stories/Article/4118860/usns-wally-schirra-completes-major-maintenance-at-south-korean-shipyard/>

34) Kim, Minseok. “South Korea To Establish F-35 Maintenance Depot By 2027.” *Aviation Week*, April 18, 2024. <https://aviationweek.com/mro/aircraft-propulsion/south-korea-establish-f-35-maintenance-depot-2027>

35) Yi Hyeon-il. “Hanhwaeoro, Mi yukgun Chinuk helgi enjin jeongbisaneop matneunda” [Hanwha Aero to Oversee U.S. Army Chinook Helicopter Engine Maintenance Project]. *Hanguk Gyeongje*, July 22, 2025. <https://www.hankyung.com/article/202507224834i>.

36) Senator Mike Lee, “Utah's Senators Introduce Bills for Navy and Coast Guard Readiness: Ensuring Naval Readiness Act,” February 12, 2025, <https://www.lee.senate.gov/2025/2/utah-s-senators-introduce-bills-for-navy-and-coast-guard-readiness>.

37) Ronald O'Rourke, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, CRS Report RL32665 (Washington, D.C.: Congressional Research Service, March 31, 2025), <https://www.congress.gov/crs-product/RL32665>.

and Hanwha Ocean rose more than 15 percent each following the bill's introduction.³⁸⁾ South Korean shipbuilders are positioning themselves to meet this demand in what analysts describe as a U.S. \$61.38 billion naval vessel MRO market,³⁹⁾ where industry commentary suggests profit margins for MRO work could be two to four times higher than for new-vessel construction.⁴⁰⁾ These developments matter not only as commercial opportunities but as indicators of how regulatory change in Washington expands the scope for allied industrial participation.

Together, these dynamics suggest Seoul's pursuit of MRO partnerships functions as a vehicle for alliance expansion and restructuring—transforming routine maintenance cooperation into a strategic platform for industrial policy coordination and deeper economic integration within the ROK-U.S. alliance.

South Korea's turn toward alliance-based MRO cooperation cannot be understood in isolation from its shifting strategic environment, which introduces new pressures and uncertainties that shape how industrial coordination is pursued and evaluated—paralleling the way U.S. strategic integration faces potential political and operational scrutiny under the second Trump administration. Over the past decade, broader geopolitical and economic changes have reshaped Seoul's calculus, redefining how it balances industrial development with alliance commitments. South Korean MRO expansion unfolds within a transformed strategic context that mirrors the shifts driving U.S. policy. The combination of U.S.-China competition,⁴¹⁾ pandemic-era supply chain disruptions, and tightening technology export controls

38) Lee, Jae-Lim. "Shipbuilding Stocks Surge to Year High as U.S. Considers Outsourcing Its Fleet." Korea JoongAng Daily, February 12, 2025. <https://koreajoongangdaily.joins.com/news/2025-02-12/business/industry/Shipbuilding-stocks-surge-to-year-high-as-US-considers-outsourcing-its-fleet/2240785>

39) Mordor Intelligence, *Naval Vessels Maintenance, Repair, and Overhaul Market - Growth, Trends, and Forecasts (2025-2030)* (2025), <https://www.mordorintelligence.com/industry-reports/naval-vessels-maintenance-repair-and-overhaul-market>.

40) McKinsey & Company, "Rising Tide: How Private Equity Can Lift the Shipbuilding Industry," McKinsey Insights, 2024, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/rising-tide-how-private-equity-can-lift-the-shipbuilding-industry>

41) Evans J. R. Revere et al., "How Will South Korea Navigate US-China Competition in 2025?," Brookings Institution, January 22, 2025, <https://www.brookings.edu/articles/how-will-south-korea-navigate-us-china-competition-in-2025/>.

has made the *anmi gyeongjung* (security with the U.S., economy with China) paradigm increasingly untenable. South Korea's dual-track strategy from the 2000s and early 2010s—hedging between economic opportunity in China and security dependence on the United States—no longer fits a world where economic and security domains are so closely intertwined.

In this changed environment, Seoul has embraced moves toward an “economic security alliance” approach, aligning industrial resilience with national security objectives. Post-COVID disruptions, and especially after the 2017 THAAD crisis, South Korean policymakers and public alike have grown more willing to view alliance-based industrial cooperation as a stabilizing alternative to Chinese economic coercion.⁴²⁾ MRO cooperation thus represents not only an industrial opportunity but also a manifestation of this broader strategic reorientation—anchoring South Korean industry in trusted allied networks while reinforcing the economic foundations of alliance durability.

As an essential case within this broader realignment, naval MRO cooperation represents a tangible pathway for translating economic security principles into alliance operations practice. Naval MRO cooperation offers distinctive advantages that make it the centerpiece of South Korea's alliance industrial strategy. While MRO and shipbuilding are distinct activities—one focused on sustainment, the other on production—their underlying industrial capabilities overlap in essential ways. Shipbuilding experience confers workforce skills, design expertise, infrastructure, and logistical networks that directly enhance a shipyard's ability to perform high-quality maintenance and repair. South Korea's comparative advantage in shipbuilding thus serves as a strong proxy for its competitiveness in MRO, particularly in large-vessel repair and modernization. In this sense, the two sectors form interdependent pillars of maritime industrial capacity rather than substitutes.

The scale of unmet U.S. Navy maintenance demand underscores the potential value

42) Gwang-seop Song, “Ban jung jeongse simhwa...hanguk-in 83% ‘gyeongje-neun yeoksi miguk’ [Anti-China Sentiment Intensifies...83% of Koreans Say ‘For Economy, It’s Still the US’],” Maeil Business News Korea, November 7, 2023, <https://www.mk.co.kr/news/world/10868600>.

of South Korean participation. A GAO assessment found that only about 40 percent of U.S. Navy ships receive timely maintenance due to aging facilities and workforce shortages, leaving major assets like amphibious warships and submarines idle.⁴³⁾ South Korean yards, by contrast, have demonstrated their capacity through steady MRO work on smaller U.S. vessels and the successful overhaul of a 40,000-ton support ship in Geoje. Analysts estimate that roughly \$4.3 billion in MRO contracts, particularly for the Seventh Fleet, could be open to South Korean firms, provided they meet Federal Acquisition Regulation (FAR), Defense Federal Acquisition Regulation Supplement (DFARS), and facility-clearance requirements.⁴⁴⁾

The MASGA initiative, which identifies naval shipbuilding as a critical U.S. national priority, provides a political and market opening through which South Korea can position its naval MRO capabilities. From this vantage point, Seoul views its contribution less about offsetting the U.S.-China production gap and more about offering flexible, allied sustainment capacity that strengthens operational resilience across the Indo-Pacific.⁴⁵⁾ This contrast with the U.S. perspective underscores how both sides interpret the same strategic dynamic differently: Washington focuses on operational constraints, while Seoul emphasizes industrial opportunity. But for now, the two perspectives are complementary, highlighting both the demand and supply sides of alliance industrial policy.

Yet regulatory frictions persist. The shipyard co-location efficiencies that underpin the competitive advantages of South Korea's naval-commercial model—shared facilities, integrated workforce, and joint technology platforms—face potential challenges from U.S. security requirements mandating segregated defense operations. To maintain compliance, South Korean firms must create ITAR-compliant facilities,

43) Grady, John. "GAO Tells Senate Panel U.S. Shipyards Are Major Readiness Concern." USNI News, 7 May 2024. <https://news.usni.org/2024/05/07/gao-tells-senate-panel-u-s-shipyards-are-major-readiness-concern>

44) Namgung Seon-hui. "Mi haegun jeollyeok ganghwa choejeok pateuneoro tteooreun Hanguk joseoneop" [Korean Shipbuilding Industry Emerging as the Optimal Partner for Strengthening U.S. Naval Power]. *Maeil Gyeongje*, May 26, 2025. <https://www.mk.co.kr/news/economy/11326526>

45) Author notes, Seoul and Daejeon, September 8-12, 2025.

separate data systems, and retrain workforces, eroding some of the cost and efficiency advantages that first made South Korean partnerships attractive.⁴⁶⁾ These implementation constraints reveal how industrial cooperation simultaneously deepens alliance interdependence and exposes structural frictions.

Taken together, South Korea's MRO strategy demonstrates how defense maintenance and sustainment activities have evolved into a central pillar of alliance industrial policy. By leveraging comparative advantage in naval systems, aligning industrial and geopolitical priorities, and managing external dependencies, Seoul transforms routine operational cooperation into a platform for economic upgrading and strategic alliance transformation.

4. The Political Economy of Alliance Industrial Integration

The divergent logics underpinning U.S. and South Korean approaches to MRO cooperation expose how distributional conflicts and institutional incentives—core concerns of political economy—shape the limits of industrial integration. MRO thus emerges not merely as operational logistics but as a site where industrial and alliance politics intersect. Its trajectory reflects three interlocking political-economic tensions: (1) expectations mismatch; (2) value capture and regulation; and (3) strategic reorientation risk, which together explain both the limits and persistence of alliance industrial integration.

At the heart of the political economy of MRO cooperation lies a potential expectations mismatch. For Washington, allied MRO is a capacity supplement—a pragmatic tool to alleviate bottlenecks and extend force readiness without eroding domestic control. For Seoul, MRO is a platform for upgrading—a steppingstone toward defense-industrial parity and greater strategic voice. The tension between these logics—reliability without dependence versus integration without

46) J. James Kim, "Waypoints and Course Adjustments: Towards Naval Shipbuilding Cooperation with South Korea." *Stimson Center*, April 9, 2025. <https://www.stimson.org/2025/waypoints-and-course-adjustments-towards-naval-shipbuilding-cooperation-with-south-korea/>.

subordination—explains both the promise and the limits of current cooperation. It defines where projects succeed (mutual benefit under shared urgency) and where they stall (when domestic constituencies perceive a threat to rents or autonomy).

As discussed in detail above, defense sustainment is the most profitable segment of the U.S. military-industrial economy.⁴⁷⁾ Aftermarket maintenance and support services generate stable margins and long-term revenue streams for prime contractors. That profitability gives industry and congressional stakeholders structural incentives to resist offshoring even when operational logic favors allied cooperation. South Korean shipyards offer cost and efficiency gains, but their entry into U.S. sustainment markets redistributes those rents. Regulation shapes how these interests are mediated: ITAR classifications define permissible repairs, facility-clearance requirements govern participation, and supply-chain transparency rules impose transaction costs that favor incumbents.⁴⁸⁾ In practice, regulatory frameworks can shape how these interests are mediated and whose participation they enable—illustrating how compliance mechanisms, while grounded in security priorities, also influence the distribution of industrial value within the alliance.

The industrial time horizons underlying MRO cooperation extend decades; political and strategic time horizons do not. South Korea's investments in U.S.-oriented facilities, workforce training, and compliance infrastructure are premised on enduring Indo-Pacific demand and U.S. dependence on allied capacity. Yet if Washington's strategic posture shifts toward homeland and Western Hemisphere priorities—as current Pentagon debates suggest—the operational rationale for forward MRO diminishes. South Korean firms could find themselves with stranded assets and declining political protection, while U.S. unions and contractors revert to protectionist defaults. This asymmetrical logic—industrial persistence versus strategic volatility—represents a fundamental vulnerability of alliance industrial

47) For example, McKinsey & Company, “Rising Tide: How Private Equity Can Lift the Shipbuilding Industry,” McKinsey Insights, 2024, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/rising-tide-how-private-equity-can-lift-the-shipbuilding-industry>.

48) U.S. Department of State, *International Traffic in Arms Regulations*, 22 C.F.R. §§120.45, 123.4, and 124.3 (Washington, D.C.: U.S. Government Publishing Office, current through 2025), <https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M>.

policy.

Even constrained cooperation produces lasting effects. MRO generates material interdependence that can outlive political cycles. Investments in facilities, security clearances, and shared standards create switching costs that make disengagement expensive. For South Korea, these sunk costs yield bargaining leverage and reputational capital; for the United States, they anchor forward presence in tangible industrial ties. In this sense, MRO cooperation reflects the industrialization of alliance politics: not just coordination through treaties or commands, but through factories, standards, and the everyday logistics of sustainment. It institutionalizes the alliance in material form.

Execution exposes how political economy constrains strategic ambition. U.S. multi-agency governance—Defense, State, Commerce—creates overlapping jurisdictions and inconsistent enforcement, while South Korea’s centralized industrial policy apparatus must navigate these fragmented gatekeepers. Differing security-classification systems complicate personnel clearances, and U.S. supply-chain transparency rules clash with South Korea’s integrated commercial-defense production model. These recurring frictions reveal a deeper pattern: alliance industrial policy evolves less through grand design than through the frictions of compliance—an adaptive process that embeds industrial integration in bureaucratic routine.

5. Conclusion

The evolution of ROK-U.S. MRO cooperation reveals how industrial coordination has become the new terrain of alliance management—where political-economic incentives determine strategic outcomes. Routine maintenance agreements now function as instruments of statecraft, determining not only readiness but also who controls technology, captures revenue, and sets the rules of cross-border production. The alliance’s industrial base is, in this sense, its strategic base.

Three core insights emerge. First, operational cooperation and industrial policy have

converged: what advances readiness also advances national competitiveness. Second, alliances today are sustained not only by shared threats or values but by shared production and maintenance systems—forms of material interdependence that can either stabilize or strain partnerships. Third, the success of alliance industrial policy depends on managing political economy asymmetries as much as strategic ones: balancing domestic rent preservation with credible upgrading pathways for partners.

Strategic uncertainty magnifies these tensions. If U.S. defense priorities pivot away from the Indo-Pacific, the rationale for South Korean-based sustainment weakens even as China's industrial scale advantage persists. The mismatch between industrial and political time horizons means that long-term investments can be undone by short-term reorientation. In that volatility lies the true test of alliance resilience.

Ultimately, MRO cooperation illustrates that the future of the ROK-U.S. alliance will be decided less by summit communiqués than by the economic geography of production and repair. As alliances become defined by the geography of production and sustainment, the political economy of where defense value is created will increasingly determine the balance of influence within them. Whether in Geoje or Pascagoula, the question is no longer who defends whom, but who builds, maintains, and profits from the machinery of defense—the answer that will define the future of the alliance.

III. Japan's MRO CAPABILITIES AND INTERNATIONAL COOPERATION

Dylan Motin

1. Japan's MRO Capabilities: Geographic Advantages and Industrial Outlook

Japan is one of the United States' most loyal and most capable allies. The country, thanks to its geographic location close to the Asian mainland, its robust industrial base, and its increasingly active security posture, has unsurprisingly emerged as a key node in the MRO infrastructure for U.S. forward forces. In order to extract insights for South Korea's ambitions in support of U.S. MRO efforts and potential trilateral cooperation, this chapter examines the structure, advantages, and challenges of Japan's MRO capabilities and its evolving cooperation with the United States.

Since the end of World War II, Japan's and the United States' threat perception has generally aligned closely. During the Cold War, both saw the Soviet Union as their primary threat, and now, both consider China their most imminent challenge. Also, both have the Taiwanese issue as the pacing contingency. Despite the legacy of World War II, the rapid postwar alignment against the Soviet Union led to unprecedented defense cooperation. Already in 1947, the Navy established the 'Ship Repair Department,' Fleet Activities in Yokosuka. The outbreak of the Korean War in June 1950 accelerated U.S.-Japanese MRO cooperation, a mere five years after the end of World War II, as Japan served as the UN Forces' key rear-area logistics base. Among U.S. allies, Japan is unique because the Seventh Fleet is permanently homeported there. Yokosuka hosts the only forward-deployed U.S. carrier strike group in the world. No other ally hosts a permanently assigned U.S. aircraft carrier. In that sense, Japan is the strategic anchor of the U.S. maritime posture in the Western Pacific, and the United States can hardly conduct major Indo-Pacific operations without Japan. Thereby, U.S.-Japan defense cooperation is deeper and more institutionalized than almost any other U.S. alliance.

Geography renders MRO cooperation with Japan particularly attractive for U.S. planners. The country's offshore position, located close to the Asian mainland, puts it near key flashpoints, especially the Taiwan Strait and the Korean Peninsula.

Moreover, its insularity isolates it from land threats, making it a relatively safe shelter for U.S. ships. The Japanese archipelago offers more strategic depth and dispersal opportunities than small Pacific islands like Guam. Central Japan also provides protection to American forces due to its distance from Chinese and Russian shores, thereby reducing the threat from short-range weapons and offering additional warning time in the event of an attack. In that sense, the Bay of Tokyo is especially attractive: it provides some protection and opens onto the Pacific Ocean while being situated in the economic heart of the country.

This makes Japan uniquely suited to support and service forward-deployed American forces, reducing the time and risk involved in trans-Pacific logistical operations. This proximity also supports rapid emergency repairs for damaged ships. In future conflict scenarios, such as the all-consuming Taiwan contingency, the ability to repair American ships, aircraft, and other platforms near the theater will be critical. Without local MRO capacity, U.S. forces would face longer downtime and reduced operational tempo, thus losing even more edge to China.

Japan's shipbuilding prowess compounds the importance of its geography. The maritime industry accounts for approximately one percent of Japan's GDP. The country ranks third after China and South Korea in the shipbuilding market, accounting for roughly 10 percent of the global market. Tokyo can boast a mature industrial base with deep experience in naval and aerospace engineering and precision manufacturing. Japan's shipbuilding and ship repair sector is highly advanced, with around 20 major companies (*Table 1*). Companies like Mitsubishi Heavy Industries (MHI), Kawasaki Heavy Industries, and IHI Corporation have decades of experience maintaining both Japanese and U.S. systems. Of note, Japan has a robust capability for floating dry-dock MRO at several commercial shipyards and military naval facilities; floating docks are essential for MRO as they enable the convenient and cost-effective lifting of vessels out of the water for hull inspections, propeller repairs, painting, and major overhauls.

Looking forward, Japan is advancing in next-generation MRO technologies and practices. Software-defined manufacturing, 3D printing, and automation, which are

now taking root throughout Japan's industries, are key enablers for future high-velocity sustainment.⁴⁹⁾ These technologies could dramatically reduce the time required for part replacement and repairs, especially in contested logistics environments. Japan's robust civilian manufacturing sector, especially in robotics, electronics, and precision tooling, also provides a foundation for expanding military MRO capabilities. The integration of digital twin technology (virtual modelling of real machines, updated with live data to predict problems before they happen) and predictive maintenance software across air and sea platforms promises to cut unscheduled failures and further enhance the resilience and responsiveness of Japan-based MRO operations.⁵⁰⁾ Indeed, MHI and other Japanese shipbuilders are already working to integrate such technologies into their operations.⁵¹⁾

49) AviTrader, "Japan Airlines to Modernise Aircraft Maintenance with IFS Cloud," June 3, 2025, <https://avitrader.com/2025/06/03/japan-airlines-to-modernise-aircraft-maintenance-with-ifs-cloud/>; Henry Canaday, "Japanese Carriers Make Predictive Maintenance Progress," *Aviation Week Network*, April 4, 2023, <https://aviationweek.com/mro/emerging-technologies/japanese-carriers-make-predictive-maintenance-progress>; Masahiko Fujikubo et al., "A Digital Twin for Ship Structures — R&D Project in Japan," *Data-Centric Engineering* 5 (2024), <https://doi.org/10.1017/dce.2024.3>; Mitsubishi Heavy Industries, "The Heart of a Rocket," *Spectra*, July 14, 2020, <https://spectra.mhi.com/the-heart-of-a-rocket>; Kiuko Notoya, "How Japan Built a 3D-Printed Train Station in 6 Hours," *New York Times*, April 8, 2025, <https://www.nytimes.com/2025/04/08/world/asia/japan-3d-station.html>; Rob O'Dwyer, "Japanese Firms Collaborate on Digital Twin Data Sharing Project," *Smart Maritime Network*, May 22, 2024, <https://smartmaritimenetwork.com/2024/05/22/japanese-firms-collaborate-on-digital-twin-data-sharing-project/>.

50) Phil Goldstein, "Navy Explores Digital Twin Tech to Enhance Maintenance, Innovation," *FedTech*, June 18, 2020, <https://fedtechmagazine.com/article/2020/06/navy-explores-digital-twin-tech-enhance-maintenance-innovation?>; Ben Rosenzweig, "If It Ain't Broke, When Do We Fix It?" *Proceedings* 147, no. 6 (2021), <https://www.usni.org/magazines/proceedings/2021/june/if-it-aint-broke-when-do-we-fix-it?>.

51) ClassNK, "Cross-Industry Collaboration Launches to Accelerate Digital Twins Uptake in Shipping," press release, May 22, 2024, https://www.classnk.or.jp/hp/en/hp_pressrelease.aspx?id=11482&layout=1&; Shunsaku Matsumoto, Tadashi Sugimura, Shin Terada, Satoshi Miyazaki, Hidekazu Ishii, and Keisuke Tsukahara, "Development of Asset Integrity Management System Using Digital Twin for Large Floating Structures," *Mitsubishi Heavy Industries Technical Review* 61 no. 2 (2024), <https://www.mhi.com/technology/review/abstract-61-2-140?>.

Table 1. Major Japanese Companies' Shipbuilding and Ship Repairing Capabilities, 2024

Major companies	20
Distinct shipyard facilities	48
Total available docks	121
Repair docks	43
Floating docks	9

Source: Japan Ship Exporters' Association, "Shipbuilding and Marine Engineering in Japan 2024," <https://www.jsea.or.jp/en/publications/sameij/>.

Note: This table does not include shipyards possessed by smaller companies.

If it were necessary to scale up MRO services for U.S. ships quickly, the Japan Maritime Self-Defense Force (JMSDF) could additionally offer its in-house capabilities. The JMSDF can provide extensive dry dock facilities, piers, and workshops at its key naval bases, such as Yokosuka, Sasebo, Maizuru, and Kure Naval Bases, and all can handle large ships. These sites support regional deployments and provide redundancy in case of congestion at larger bases. A weakness remains, however. The JMSDF maintains only fixed dry docks, and there is no public evidence that it possesses in-house large auxiliary floating dry docks like those historically used by the Imperial Japanese Navy during World War II. It means that in case of emergency and wartime, the JMSDF can only provide on-site MRO to damaged American capital ships through commercial vessels.

The strategic rationale for greater MRO integration with Tokyo is clear. U.S. vessels based in Japan are often sent back to the United States for major overhauls, which frequently take months or even years to complete. Meanwhile, ships receiving MRO in Japanese ports could remain deployed in the region for more extended periods. Moreover, many in Washington hope that Japan's formidable shipbuilding capabilities can help the United States overcome its own shipbuilding bottlenecks and increase the production of warships to keep pace with China.⁵²⁾

52) Gabriel Dominguez, "U.S. Secretary of the Navy Weighs 'Dual-Use' Shipbuilding with Japan," *Japan Times*, April 28, 2025, <https://www.japantimes.co.jp/news/2025/04/28/japan/politics/japan-us-shipbuilding/>; Miyeon Oh and Michael Cecire, "Why the United States, South Korea, and Japan Must Cooperate on Shipbuilding," *RAND*, May 6, 2025, <https://www.rand.org/pubs/c>

2. U.S.–Japan MRO Cooperation

Since at least the Korean War, Japan has been an integral part of the U.S. sustainment network in the region, particularly under the umbrella of bilateral security agreements. An agreement signed in the 1970s allowed MRO work for Japanese ships to be performed at the two American repair facilities (Yokosuka and Sasebo bases) alongside U.S. ships.⁵³⁾ The Japan-U.S. Acquisition & Cross-Servicing Agreement, signed in 1996 and revised several times since, allows Japanese forces to provide logistical support, supplies (such as ammunition), and services (including repair and maintenance services).⁵⁴⁾ But integrated naval MRO cooperation took off only recently.

Japanese-American MRO cooperation received significant political impetus under the Biden administration. Then U.S. ambassador to Japan Rahm Emanuel pushed for the MRO for U.S. Navy ships to be done at Japanese commercial shipyards, underlining in 2023 that “whether Washington is focused on maintaining our ships or on building overall naval strength, Japan is key to our regional deterrence strategy.”⁵⁵⁾ Japan is now a central piece of the Regional Sustainment Framework announced in 2024 to build a network of dispersed, faster, and more resilient forward MRO capabilities, alongside South Korea, Australia, Singapore, and the Philippines. Recent defense cooperation and industrial base discussions between the U.S. and Japan have included expanding ship repair capacity in Japan to mitigate fleet strain and shipyard backlogs in the United States.

The U.S. Navy’s Seventh Fleet (headquartered in Yokosuka) operates numerous vessels in the Western Pacific. Routine and maintenance, repairs, and overhauls for these ships are frequently performed at U.S. Fleet Activities Yokosuka (est. 1947,

ommentary/2025/05/why-the-united-states-south-korea-and-japan-must-cooperate.html.

53) U.S. Navy, “CFAY Port Ops Supports Dry Dock Evolution for JMSDF Ship Enshu,” July 3, 2019, <https://www.navy.mil/Press-Office/Press-Releases/display-pressreleases/Article/2238315/cfay-port-ops-supports-dry-dock-evolution-for-jmsdf-ship-enshu/>.

54) Japanese Ministry of Defense, “Defense of Japan 2020,” 312–313, https://www.mod.go.jp/en/public/w_paper/wp_2020.html.

55) Quoted in Moyuru Tanaka, “Navigating the Competitive Seas: U.S.-Japan Future Collaboration in the Shipbuilding Industry,” *CSIS*, August 13, 2024, <https://www.csis.org/analysis/navigating-competitive-seas>.

the Navy's largest overseas maintenance facility, located in Tokyo Bay) and Sasebo (est. 1984, on the island of Kyūshū). Both facilities form the Ship Repair Facility and Japan Regional Maintenance Center (SRF-JRMC), which is under the responsibility of the Naval Sea Systems Command. Fleet Activities Yokosuka is a major facility equipped with six large graving docks that can accommodate a combined 530,000 tons of displacement, along with numerous workshops, 19 wet berths, and piers, including one specifically designed for aircraft carriers (SRF-JRMC is responsible for the Japan-based USS *Ronald Reagan*). Nevertheless, these two maintenance centers often fail to deliver ships on schedule, accumulating delays. The SRF-JRMC's workforce comprises about 3,000 individuals, including 120 U.S. military members, over 325 U.S. civilian personnel, and approximately 2,500 Japanese workers.⁵⁶⁾

The U.S.-Japan Status of Forces Agreement enables cooperation on logistical and repair operations. Japanese shipyards such as Mitsubishi Heavy Industries and Japan Marine United are now regularly contracted for work on U.S. Navy ships stationed in Japan. These services may include hull and mechanical repairs, propulsion system maintenance, structural modifications, painting and coatings, and sometimes even complex dry-dock overhauls. Japanese contractors are thoroughly vetted and must meet U.S. military standards for quality and security. MHI, JMU, and Sumitomo Heavy Industries (SRF-JRMC's main contractor in the past) have secured Master Ship Repair Agreements. This certification allows private companies to work on Navy vessels.⁵⁷⁾ In January 2024, the U.S. Navy and Japanese shipyards launched a new partnership set to transform naval maintenance capabilities across the Indo-Pacific. The initiative sought to significantly reduce vessel downtime and bolster fleet readiness by conducting comprehensive maintenance, repair, and overhaul operations at Japanese facilities.⁵⁸⁾

56) NAVSEA, "Command Operations," <https://www.navsea.navy.mil/Home/RMC/SRFJRMC/JapanTours/WorkingInJapan/SRFJRMCYokoOperations/>; United States Government Accountability Office, "Navy Ship Maintenance: Actions Needed to Address Maintenance Delays for Surface Ships Based Overseas," Report to Congressional Committees, February 2020, GAO-20-86.

57) Already in 2013 for JMU. Highergov, "Japan Marine United Corporation," <https://www.highergo.com/awardee/japan-marine-united-corporation-10407649/>.

In April 2024, Japanese Prime Minister Fumio Kishida visited Washington, where he met with President Joe Biden. The resulting joint statement outlined a range of initiatives to strengthen defense and security cooperation. Among these was the creation of the Forum on Defense Industrial Cooperation, Acquisition, and Sustainment (DICAS), designed to mobilize both nations' industrial bases to bolster production and sustain long-term readiness. The first DICAS meeting took place in Tokyo in June 2024, and the Ship Repair Working Group, one of DICAS's four working groups, started its work of coordinating efforts among the U.S. Navy, the Japan Maritime Self-Defense Force, and private shipyards. It aims to expand the scope to full-scale repairs, including destroyers, and to standardize systems for greater efficiency.⁵⁹⁾

In late 2024, MHI's shipyards in Yokohama were awarded a contract to overhaul the Lewis B. Puller-class expeditionary sea base USS *Miguel Keith* for \$12 million. Until then, the Navy had only granted Japanese shipyards small projects. However, the ship had no planned visit to the United States in the coming months, and since the project was to last less than six months, the Japanese option was selected. About the same time that the work on the *Keith* was completed in April 2025, newly appointed Secretary of the Navy John Phelan visited shipyards in Japan and South Korea to push the new Trump administration's agenda of reviving and expanding shipbuilding capabilities. This episode represented the first time a Japanese shipyard undertook such a massive overhaul of a U.S. Navy ship. According to Captain Wendel Penetrante, Commander of SRF-JRMC:

The ability to use Mitsubishi Heavy Industry's shipyard to conduct this level of maintenance availability has allowed SRF-JRMC's organic workforce in Yokosuka to focus their efforts on the three other warship maintenance availabilities being conducted simultaneously. We were even able to complete one of those availabilities 3 days early and respond to two unplanned voyage repairs.⁶⁰⁾

58) DSEI Japan, "Japan-US Naval MRO Partnership Opens New Opportunities for Business at DSEI Japan 2025," April 10, 2025, <https://www.dsei-japan.com/news/japan-naval-mro-partnership-opens-new-opportunities-business-dsei-japan-2025>.

59) Tanaka, "Navigating the Competitive Seas."

Another type of Japanese support to U.S. MRO needs is Master Labor Contract (MLC) employees. These are Japanese civilian experts directly employed by the Government of Japan under a formal agreement with U.S. Forces in Japan. At SRF-JRMC Yokosuka, over 80% of the workforce are MLCs, performing the majority of ship repair and overhaul tasks. Thanks to this subsidized labor, using Yokosuka is cheaper than sending U.S. ships back to U.S. yards or using private contractors. Moreover, SRF-JRMC has employed local Japanese contractors for many years; around 80% of the workload is done by the organic workforce, and the rest by outside contractors.⁶¹⁾

In domains adjacent to ship maintenance, cooperation is advancing as well. In ports, ships need to replenish their ammunition stocks. Japan has recently proposed co-production and co-sustainment of advanced missile systems, such as the ship-to-air missile SM-6, aligning with statements from Japanese defense officials promoting mutual industrial support.⁶²⁾ If this initiative bears fruit, American ships undergoing maintenance in Japanese ports could also be loaded with anti-air missiles manufactured in Japan, which would further shorten American logistical chains. In addition, the U.S. Air Force Sustainment Center, under its Global Enterprise Network for Universal Sustainment initiative, is considering establishing a joint maintenance center in Japan to perform repairs on American and Japanese aircraft, thereby eliminating the need for aircraft to cross the Pacific.⁶³⁾ This could one day lead to Navy aircraft being refitted on Japanese soil, further accelerating response times,

60) The Maritime Executive, "Japan's Mitsubishi Shipyard Completes Largest Overhaul Contract for US Navy," May 2, 2025, <https://www.maritime-executive.com/article/japan-s-mitsubishi-shipyard-completes-largest-overhaul-contract-for-us-navy>.

61) Randall Baucom, "SRF-JRMC Completes Its Second CVN Hanger Mezzanine Installation," *DVIDS*, April 21, 2025, <https://www.dvidshub.net/news/496772/srf-jrmc-completes-its-second-cvn-hanger-mezzanine-installation>; NAVSEA, "Command Operations."

62) Kosuke Takahashi, "Japan Proposes Co-Production of SM-6 Missiles to the U.S.," *Naval News*, April 3, 2025, <https://www.navalnews.com/naval-news/2025/04/japan-proposes-co-production-of-sm-6-missiles-to-the-u-s/>.

63) Unshin Lee Harpley, "USAF, Japan Look to Share Maintenance on Common Aircraft Closer to the Fight," *Air & Space Forces Magazine*, March 14, 2025, <https://www.airandspaceforces.com/usaf-japan-share-maintenance-common-aircraft/>. See, also, Cynthia R. Cook et al., *Enabling Forward Sustainment: Japanese Industry's Potential Role in U.S. Airpower Readiness* (Washington, D.C.: Center for Strategic and International Studies, 2025).

reducing wear and tear, and eliminating the cost of back-and-forth trips across the Pacific.

3. Challenges

Despite this deepening cooperation, five key challenges limit Japan's current and future role in American MRO: U.S. law, China's growing strike capabilities, demographic decline, decreasing commercial shipbuilding, and South Korea's competition.

First, U.S. law remains a key limitation for a larger-scale MRO cooperation. Japanese shipyards are legally prohibited from servicing Navy ships based in American territory. As a general rule, vessels whose homeport is in the U.S. or Guam may not be overhauled, repaired, or maintained in foreign shipyards. Voyage repairs, combat damage fixes, or preventive maintenance on deployed ships might be performed overseas only if the work is limited to 21 days or less. Annually, such overseas maintenance cannot exceed 2% of the homeport's average annual workload. This may be one of the reasons why MRO for American ships is less advanced than for aircraft. Such regulations made sense in earlier times, when domestic shipyard capabilities were plentiful. However, in the current naval industry crisis, they are very hard to justify. Unless U.S. law changes, MRO work in Japan or South Korea is bound to remain limited to a small portion of the Navy's fleet.

Second, whether American ships immobilized in Japanese shipyards, and these Japanese shipyards themselves, are truly safe from enemy attack is doubtful. During the last few decades, China's capabilities to strike at long range have grown in versatility, quantity, and quality.⁶⁴ One wonders how well MRO services in Japan would perform in wartime against an adversary as formidable as Beijing. For instance, bases on Kyūshū open on the East China Sea and face China directly, and would thus likely suffer intense attacks in wartime. To offer a safe MRO environment, South

64) Nicholas D. Anderson and Daryl G. Press, "Access Denied? The Sino-American Contest for Military Primacy in Asia," *International Security* 50, no. 1 (2025): 118-151.

Korea, too, will have to ponder the security of its shipyards.

Third, Japan's demographic decline is a persistent hurdle. The shipbuilding industry, and especially expert manual labor, is already struggling to form and employ enough specialists. The Japanese shipbuilding workforce declined by over 12% in the past five years.⁶⁵⁾ In the future, the intensifying Japanese labor shortage could seriously compromise Tokyo's ability to scale up MRO work for the U.S. Navy, leading to delays. As South Korea also experiences rapid demographic collapse, there is little doubt that Seoul will soon face similar headwinds. Hence, how Japan addresses specialized labor shortages should be of great interest to South Korean industries and planners.

Fourth, the decline of the Japanese shipbuilding industry may end up reducing its MRO capabilities. Japan now receives fewer new orders for commercial ships than a few years ago. As Japan's market share shrinks and the overall orderbook diminishes, industry consolidation follows. Several key shipyards have already exited the commercial market in recent years, and Sumitomo Heavy Industries ceased commercial shipbuilding altogether. This results in a decline in shipyard capacity. Japan had 194 shipbuilding facilities in 2018, and only 178 remained in 2024. Over the long run, and without government attention, this may reflect in the available capacities of private industries to scale up for the military sector. Japan is aware of the issue; it is preparing a \$6.9 billion 'national dockyard' initiative to expand and modernize domestic shipyards to secure the capacity to handle repairs for U.S. Navy vessels. Under the plan, the government would fund the refurbishment or construction of shipyard infrastructure, which it would later transfer to private companies.⁶⁶⁾

65) Mfame, "Japan's Government Leads Effort to Reclaim Global Shipbuilding Leadership," June 24, 2025, <https://mfame.guru/japans-government-leads-effort-to-reclaim-global-shipbuilding-leadership/>.

66) Georgios Georgiou, "Japanese Shipyards Face Declining Market Share amid Full Orderbooks, Consolidation," *Riviera*, April 3, 2025, <https://www.rivieramm.com/news-content-hub/news-content-hub/japanese-shipyards-face-declining-market-share-amid-full-orderbooks-and-consolidation-84374>; Julian Ryall, "Japan Plans US\$6.9 Billion Shipyard Push: For US Trade, Defence Talks Leverage?" *SCMP*, July 2, 2025, <https://www.scmp.com/week-asia/politics/article/3316542/japan-plans-us69-billion-shipyard-push-us-trade-defence-talks-leverage>.

Finally, and this is the topic of this report, there is a sharpening of South Korean concurrence over American MRO contracts. In 2024, Hanwha Ocean won a contract to service the U.S. Navy's replenishment oiler *Yukon*, a job previously assigned to Japanese bases. This has raised concerns in the Japanese shipbuilding sector that its centrality to U.S. logistics could erode. As a shipbuilding industry insider explained: "The fact that the U.S. Navy's 7th Fleet has entrusted all ship MRO work that had been conducted at Japanese bases to South Korea shows a change in the landscape."⁶⁷⁾ While South Korea's growing capabilities add redundancy to the regional MRO network, Japan may lose market shares, thus reducing its long-term appetite for MRO cooperation.

4. Conclusion: What Space for Trilateral Cooperation?

Japan is a natural partner for supporting American MRO efforts. It faces the same threats as the United States, considering China is its most dangerous rival. Its geographical position is both close enough to the Asian mainland to provide a forward base and distant enough to provide some shelter. Tokyo can bring formidable industrial resources to bear. U.S.-Japanese MRO cooperation has become increasingly institutionalized in recent years. Challenges (legal limitations, demographics, commercial shipbuilding decline, and facility security) exist, but are unlikely to put a stop to this trend. Even South Korea's rise as a competitor is probably no definitive shift away from Japan. Secretary of the Navy Carlos Del Toro visited Mitsubishi Heavy Industries in February 2024, before visiting Hanwha Ocean, which was ultimately awarded the contract to maintain the support vessel USNS *Wally Schirra* in August.⁶⁸⁾ This suggests that Japan remains competitive and is still a serious contender for such contracts. For instance, in the near future, experts expect U.S.-Japanese naval MRO to widen to encompass full-fledged repair work on destroyers.⁶⁹⁾ Since intense thinking has been done in Japan since 2024, the MRO

67) Nam-hee Kim, "South Korea, Japan Compete for U.S. Shipbuilding and MRO Contracts," *Chosun Biz*, December 26, 2024, <https://biz.chosun.com/en/en-industry/2024/12/26/JZ5GH5XCHZBATCPC3UJNQV6WD4/>.

68) Kim, "South Korea, Japan Compete."

cooperation seems to have now found its cruising speed.

Building on the comparison, South Korea presents several weaknesses that may limit its attractiveness relative to Japan. Threat perceptions may be misaligned, as Seoul devotes far more attention to North Korea than either Washington or Tokyo. Due to their geographic proximity, South Korean shipyards might be more vulnerable to potential attacks from China or North Korea. Indeed, Beijing now enjoys a clear-cut military superiority in the West Sea (Yellow Sea), and in times of war, docking on the western coastline of South Korea would be unthinkable.⁷⁰⁾ While large U.S. naval forces are based in Japan, the Navy's presence in South Korea is very limited. Thus, there is no 'captive market' for South Korean dockyards. Moreover, South Korea faces similar legal restraints from U.S. regulations on foreign MRO services, and considering the country's abysmal fertility rates, its demographic crisis is likely to worsen dramatically and impact its long-term industrial potential. All in all, South Korea will likely gain market shares from Japan, but it is highly unlikely to replace it. Hence, South Korea should go to great lengths to market itself as a cog in a redundant Indo-Pacific MRO network to offer additional resilience and speed, and allow greater dispersal than relying only on Japan.

This leads to the issue of trilateral cooperation. At the Camp David Summit in 2023, South Korea, Japan, and the United States laid the groundwork for increased trilateral defense cooperation. The Department of War's 2024 Regional Sustainment Framework aims to develop MRO capabilities distributed across Japan and South Korea (alongside Australia, Singapore, and the Philippines), showing Washington's interest in integrating the two closely to optimize the distribution of MRO works and minimize ship downtime. Yet, ROK-U.S. and U.S.-Japan cooperation is highly siloed, and proper trilateral integration remains absent. Establishing trilateral MRO cooperation among South Korea, Japan, and the United States will be difficult, as Tokyo and Seoul will compete for the same market. Due to legal hurdles, only

69) DSEI Japan, "Japan-US Naval MRO Partnership."

70) Sang Hun Seok, "The Yellow Sea: An Overlooked Geopolitical Hotspot," *RUSI*, January 29, 2025, <https://www.rusi.org/explore-our-research/publications/commentary/yellow-sea-overlooked-geopolitical-hotspot>.

American ships based in the region will be able to benefit from MRO in South Korea. Hence, these ships will have to come overwhelmingly from Japan. Moreover, there is little industrial complementarity between South Korea and Japan, as both excel in the same areas.

Since the United States would likely eagerly accept any trilateral cooperation, the ball is in Tokyo's and Seoul's court. The first and unescapable step is political impetus: high-level decision-makers should drive their bureaucracies and industries forward, as seen recently at the August 2025 summit between Lee Jae Myung and Donald Trump. Then, it would be necessary to create a coordinating group comprising senior defense officials from the three countries, navy representatives, and industrial stakeholders — à la DICAS — to iron out the who-does-what. Such a group should promote cooperation in a way that does not hurt Japanese or South Korean industrial interests to the extent it creates resentment in Tokyo or Seoul. Only then could the three countries move to an efficient division of labor that maximizes MRO efficiency and alliance coordination.

IV. SOUTH KOREA'S MRO CAPABILITIES AND INTERNATIONAL COOPERATION

Kuyoun Chung

1. Introduction

Maintenance, repair, and overhaul (MRO) has emerged as one of the most critical yet underexamined domains in alliance defense cooperation. Unlike procurement or arms sales, which are often politicized and episodic, MRO addresses the long-term sustainability of military capabilities by ensuring that complex defense system – from aircraft engines to naval vessels– remain mission ready. Globally, MRO accounts for approximately 70% of the lifecycle cost of weapon systems, highlighting its critical role in defense management and operational readiness.⁷¹⁾ For middle powers like South Korea, MRO capability is more than an industrial sector: it is a strategic lever to deepen defense self-reliance, enhance alliance interoperability, and contribute to broader regional security architectures.

South Korea's MRO sector has evolved rapidly alongside its broader defense industry, now ranked as the eighth largest arms exporter worldwide.⁷²⁾ Indigenous companies such as Hanwha Aerospace, Korea Aerospace Industries (KAI), and HD Hyundai Heavy Industries have built sophisticated capabilities in engine maintenance, avionics, and naval vessel overhaul. Hanwha Aerospace, for instance, has provided engine MRO service for over four decades and recently won contracts to overhaul the engines of the U.S. Army's CH-47 Chinook Helicopters in Korea.⁷³⁾ In the naval domain, Korean shipyards such as Hanwha Ocean and HD Hyundai Heavy Industries

71) Hanwha, "How maintenance, repair and overhaul is modernizing global defense capabilities" (April 29, 2025). <https://www.hanwha.com/newsroom/news/feature-stories/how-maintenance-repair-and-overhaul-is-modernizing-global-defense-capabilities.do>

72) Reuter, "South Korea's Hanwha Ocean target US Navy orders as Trump seeks shipbuilding ties" (May 5, 2025) <https://www.reuters.com/world/asia-pacific/south-koreas-hanwha-ocean-targets-us-navy-orders-trump-seeks-shipbuilding-ties-2025-05-05/>

73) Breaking Defense, "South Korea to perform engine overhauls for US Army Chinooks" (July 25, 2025). <https://breakingdefense.com/2025/07/south-korea-to-perform-engine-overhauls-for-us-army-chinooks/>

have begun servicing U.S. Navy supply and logistic ships, including the USNS Wally Schirra and USNS Alan Shepard – a development that extends the operational life of U.S. vessels without requiring costly transits to American Shipyards.⁷⁴⁾ These cases demonstrates that Korean MRO capabilities are no longer limited to domestic requirements but are increasingly integrated into allied force sustainment.

For the United States, strengthening MRO partnerships with South Korea is not merely a matter of efficiency but of strategy. The Indo-Pacific theater poses unique logistical challenges: vast distances, contested sea lines of communication, and the risk of Chinese anti-access/area-denial (A2/AD) strategies disrupting forward presence. By localizing MRO functions in South Korea, the U.S. military reduces downtime, shortens supply chains, and secures reliable forward sustainment hubs. This aligns with the U.S. Indo-Pacific strategy's emphasis on resilience, distributed basing, and alliance burden-sharing. It also reflects a broader evolution of the U.S.-ROK alliance from a patron-client security relationship to a partnership of shared industrial and technological responsibilities.

At the alliance level, MRO cooperation is politically significant because it reinforces the credibility of extended deterrence and alliance modernization. By investing in shared sustainment capacity, Washington signals trust in Seoul as a dependable industrial partner, while South Korea gains a concrete role in supporting U.S. force posture in the region. This dynamic may help offset alliance tensions over cost-sharing and troop deployments by embedding cooperation in long-term industrial frameworks. Moreover, MRO integration advances interoperability, not only at the tactical level of shared equipment but also in the strategic management of defense supply chains—an increasingly vital element of collective security.

Yet, challenges remain. U.S. technology transfer regulations, such as the International Traffic in Arms Regulation (ITAR), constrain the scope of Korean firms' access to sensitive systems, while competition with Japan, Australia, and Singapore for MRO

74) US Forces Korea, "USNS Wally Schirra Completes major Maintenance at South Korean Shipyard" (March 12, 2025). <https://www.usfk.mil/Media/Newsroom/News/Article/4119997/usns-wally-schirra-completes-major-maintenance-at-south-korean-shipyard/>

contracts underscores the geopolitical stakes of becoming the Indo-Pacific's premier sustainment hub. Additionally, South Korea must balance its ambition to become a global MRO leader with the imperative to maintain cost-competitiveness and meet exacting NATO-aligned standards. These issues highlight the dual nature of MRO cooperation: it is simultaneously an opportunity for alliance deepening and a test of how industrial integration intersects with national autonomy.

2. South Korea's MRO Capabilities

South Korea's Maintenance, Repair, and Overhaul (MRO) sector has evolved into a vital component of its defense industrial base, encompassing both aerospace and naval domains. While aerospace MRO has been the traditional strength—supporting fighter jets, helicopters, and transport aircraft—the naval and shipyard segments have recently gained prominence. With global-class shipbuilders such as HD Hyundai Heavy Industries, Hanwha Ocean, and HJ Shipbuilding & Construction, South Korea is now positioned as a serious contender to serve as an Indo-Pacific hub for U.S. and allied naval sustainment. This chapter provides an expanded overview of South Korea's MRO capabilities, with a particular emphasis on the naval sector, examining recent cases, strategic opportunities, and the constraints that shape South Korea's ambition to emerge as a regional leader in ship maintenance and overhaul.

1) Aerospace and Engine MRO

South Korea's aerospace MRO capabilities provide an important baseline for understanding its broader sustainment strengths. **Hanwha Aerospace** has developed robust capabilities in gas turbine engines, offering services for the **T700** engines powering UH-60 Black Hawks and AH-64 Apaches, as well as the **F100** and **F404** engines used in F-15K and KF-16 fighters. In 2025, Hanwha secured a high-profile contract to overhaul **T55 engines** for U.S. Army CH-47 Chinooks deployed in South Korea, eliminating the need for long-distance repairs in the continental United States.

Meanwhile, Korea Aerospace Industries (KAI) has focused on integrated life-cycle

support for the ROKAF's T-50 and FA-50 aircraft, while Korean Air's Aerospace Division continues to provide MRO services for military transports and surveillance platforms. Also, South Korea will build its own maintenance facility for its F-35A stealth jets by 2027, which is a move that would enhance operational efficiency.⁷⁵⁾

2) Naval and Shipyard MRO

South Korea's global reputation as a shipbuilding powerhouse—consistently ranking among the top three in the world alongside China and Japan—forms the basis of its naval MRO strength. Unlike many countries that separate naval and commercial shipyards, South Korea's dual-use industrial base allows it to apply cutting-edge techniques from commercial shipping to naval vessels.

Initially, South Korean shipyards focused on sustaining the ROK Navy's growing blue-water fleet, including KDX destroyers, Aegis-equipped KDX-III ships, and KSS submarines. Domestic requirements provided a steady workload: routine dockings, system upgrades, and life-extension projects. As the ROK Navy expanded its regional role—deploying to anti-piracy missions in the Gulf of Aden and participating in multinational exercises—the need for timely and reliable MRO services grew in parallel.

A turning point came in 2025, when South Korean shipyards began servicing U.S. Navy vessels. In March, Hanwha Ocean completed a major overhaul of the USNS Wally Schirra, a dry cargo and ammunition resupply ship. The project involved extensive structural repairs and systems updates, extending the vessel's operational life by an estimated 15-20 years. This marked the first time such large-scale U.S. naval maintenance had been conducted in South Korea, signaling Washington's trust in Seoul's industrial base.

Soon after, HD Hyundai Heavy Industries secured a contract for the USNS Alan

75) Korea Joongang Daily, "Korea to build F-35 fighter jet maintenance facility at Cheongju air base" (April 18, 2024). <https://koreajoongangdaily.joins.com/news/2024-04-18/national/defense/Korea-to-build-F35-fighter-jet-maintenance-facility-at-Cheongju-air-base/2028503>.

Shepard, another dry cargo ship. These cases underscored the cost and efficiency advantages of using South Korean facilities compared to sending vessels to Pearl Harbor or the U.S. mainland. For the U.S., this diversification of sustainment hubs directly supports the Pentagon's emphasis on distributed maritime logistics in the Indo-Pacific.

South Korea's shipyards are now competing to secure a larger role in U.S. naval sustainment contracts. A 2025 survey identified three shipyards—HD Hyundai Heavy Industries in Gunsan, HJ Shipbuilding in Busan, and Shipbuilding in Geoje—as candidates for expanded cooperation. Each offers different advantages: Hyundai has massive capacity and advanced facilities; Hanwha Ocean specializes in complex naval vessels; HJ Shipbuilding is efficient in medium-scale refits. Together, these firms position South Korea as a comprehensive MRO partner for U.S. and allied fleets.

This dovetails with the policy under the Make American Shipbuilding Great Again (MASGA) initiative, which seeks to leverage allied shipyards to offset U.S. domestic capacity shortfalls. The MASGA initiative reflects the U.S. desire to revitalize its maritime heavy-industrial base while simultaneously enhancing its operational sustainment posture in the Indo-Pacific. With China dominating global shipbuilding and the U.S. shipyard workforce atrophying, Washington has sought to allied partnership to bridge both short-term sustainment gaps and longer-term industrial renewal.⁷⁶⁾ As part of this strategy, MASGA identifies three major thrust: rebuilding U.S. naval and commercial shipbuilding capacity, outsourcing non-strategic repair and overhaul(MRO) work to trusted partners, and shortening force-generation timelines by forward-locating maintenance and logistics in allied yards. For South Korea, which is a home to world-class shipbuilders such as HD Hyundai Heavy Industries and Hanwha Ocean, the initiative offers a dual opportunity, which includes deepening defense-industrial integration with the U.S. and the position South Korean yards as strategic sustainment hubs for the alliance. Indeed, Seoul pledged roughly

76) Peter K. Lee. "MAASGA, Making American and Allied Shipbuilding Great Again," Asan Institute for Policy Studies Issue Brief (No. 2025-07).

USD 150 Billion of shipbuilding cooperation under the MASGA banner to secure more favorable tariff treatment and industrial access.⁷⁷⁾

At the August 2025 summit between President Lee Jae Myung of South Korea and President Donald Trump of the US, the MASGA emerged as a central component of the industrial and security agenda. Two leaders agreed to deepen manufacturing, shipbuilding, energy and defense ties, with Trump explicitly stating that U.S. shipbuilding would “buy ships from South Korea... but also have them made here with our people, using our people.”⁷⁸⁾ Seoul welcomed the initiative as part of a broader contribution to Washington’s industrial-security posture, while South Korean companies committed to large-scale investments in the U.S., anchored by the MASGA shipbuilding partnership. Yet the details remain uncertain. How much work is relocated to the U.S, how much South Korean yards will integrate into U.S. regulatory frameworks (e.g. Jones Act, Buy American) and how the industrial control tower for this initiative will be structured, are yet to be decided.

Another area of uncertainty is about two countries’ recent decision on nuclear-powered attack submarine. During the ROK-US summit in November 2025, Trump stated on social media that he had “approved South Korea to build a nuclear-powered submarine,” as a response to South Korea’s request to enhance undersea deterrence capabilities. A detailed joint fact sheet released shortly afterward noted that “the United States has given approval for South Korea to build nuclear-powered attack submarines,” situating this decision within a broader package of bilateral shipbuilding and defense-industrial cooperation agreement.⁷⁹⁾ However, the summit outcome seems to include the understanding that the US

77) Reuter, “Make America Shipbuilding Great Again’ package key to reaching trade deal, South Korea Says” (July 31, 2025). <https://www.reuters.com/world/china/make-america-shipbuilding-great-again-package-key-reaching-trade-deal-south-2025-07-31/>.

78) Korea Times, “Lee, Trump Agree to deepen industrial ties, highlighting shipbuilding, energy, defense” (August 26, 2025). <https://www.koreatimes.co.kr/foreignaffairs/20250826/summit-lee-trump-agree-to-deepen-industrial-ties-highlighting-shipbuilding-energy-defense>.

79) Korea Times, “South Korea, US released details of deal including Korean investment in Shipbuilding.” (November 14, 2025). <https://www.koreatimes.co.kr/foreignaffairs/20251114/south-korea-us-release-details-of-deal-including-korean-investment-in-shipbuilding>.

endorsement for Seoul to begin preparation for a nuclear-powered submarine program, though the agreement centers on enabling South Korea to meet advance requirements for the project, including avenues to source fuel, rather than the immediate transfer of reactor or propulsion technology covered under longstanding U.S. legal restriction.⁸⁰⁾ Also, congressional authorization remain undefined and will require extensive follow-up negotiation. Taken together, this development suggest a dramatic political breakthrough, which is mainly driven by Trump's personal decision, while still leaving the structural legal barriers unresolved, which have historically constrained U.S. submarine-propulsion cooperation with any ally outside the AUKUS framework.

In any case, all of these initiatives are politically framed as bolstering U.S. industry, in practice it acknowledges the value of partnerships with allies such as South Korea.

Compared to other Indo-Pacific allies, South Korea holds several advantages:

- Scale and capacity: South Korean yards rank among the largest globally, handling both mega-container ships and advanced naval combatants.
- Proximity: South Korea's geographic position, close to the Korean Peninsula, Japan, and northern Pacific routes, makes it ideal for servicing U.S. Seventh Fleet assets.
- Technical sophistication: South Korea's experience in nuclear submarine construction support (albeit indirectly through component supply chains) and advanced Aegis destroyer maintenance places it ahead of Southeast Asian facilities.

However, South Korea faces competition from Japan's Yokosuka base, Singapore's Sembawang Shipyard, and Australia's Perth facilities. Each is expanding its MRO offerings for U.S. forces. The challenge for South Korea is to consolidate its comparative advantage by emphasizing speed, cost-effectiveness, and reliability.

80) Reuter, "U.S. South Korea unveil details on shipbuilding investment and subs in trade deal" (November 14, 2025). <https://www.reuters.com/world/asia-pacific/us-south-korea-release-de-tails-deal-including-korean-investment-shipbuilding-2025-11-14/>.

A distinctive feature of South Korea's naval MRO sector is its dual-use integration. Shipyards that build and service some of the world's largest LNG carriers and container vessels apply the same infrastructure to naval sustainment. For example, Busan and Ulsan shipyards that handle commercial supertankers can easily dry-dock large naval auxiliaries. This integration generates economies of scale, ensuring that South Korea's naval MRO costs remain competitive despite relatively higher labor expenses compared to Southeast Asia.

Moreover, civilian MRO capacity provides surge resilience in wartime. Should a conflict disrupt naval operations, South Korea could redirect commercial yard capacity toward military sustainment, a flexibility that few regional competitors possess.

Despite these strengths, South Korea's naval MRO ambitions face several constraints:

- Technology transfer limits: U.S. export control regimes restrict South Korean access to sensitive systems, including nuclear propulsion. This prevents South Korea from servicing U.S. aircraft carriers or nuclear submarines.
- Strategic competition: Japan and Australia are actively lobbying for greater U.S. MRO contracts, leveraging their geographic advantages and longstanding political trust.
- Domestic capacity management: South Korean shipbuilders must balance lucrative commercial contracts with military sustainment, creating potential bottlenecks.
- Strategic vulnerability: As MRO facilities become critical to U.S. force projection, they could become priority targets for adversaries in conflict scenarios.

3. Strategic Significance in the ROK-U.S. Alliance

The development of South Korea's Maintenance, Repair, and Overhaul (MRO) capabilities carries profound implications for the U.S.-ROK alliance. Beyond its technical and industrial dimensions, MRO cooperation reshapes how the alliance sustains military readiness, shares burdens, and signals credibility to adversaries and partners alike. This chapter explores the strategic significance of South Korean MRO capacity in three key areas: enhancing operational resilience, advancing alliance modernization, and reinforcing deterrence and interoperability in the Indo-Pacific.

1) Enhancing operational resilience in the Indo-Pacific

The Indo-Pacific is characterized by vast geography, contested chokepoints, and adversary anti-access/area-denial (A2/AD) strategies, all of which complicate logistics and sustainment. Traditionally, U.S. forces deployed to the region have relied on maintenance hubs in Japan, Guam, Hawaii, and the continental United States. However, these facilities face capacity limits and are vulnerable to geopolitical disruption or adversary targeting in a conflict scenario.

By leveraging South Korea's advanced industrial base, the United States gains access to a forward sustainment hub that reduces repair turnaround times and lowers operational risk. For example, the 2025 decision to overhaul U.S. Army CH-47 Chinook engines in South Korea cut months off the repair cycle compared to shipping them back to the U.S. mainland. Similarly, U.S. Navy auxiliary ships repaired in South Korean shipyards—such as the *USNS Wally Schirra* and *USNS Alan Shepard*—demonstrated the feasibility of distributing maintenance beyond traditional hubs.⁸¹⁾

In this sense, MRO cooperation enhances resilience, ensuring that U.S. and ROK

81) Business Insider, "A South Korean Shipyard just picked up a new repair job from the US Navy as it turns to allies to help fix the fleet" (April 7, 2025) <https://www.businessinsider.com/key-pacific-allies-shipyard-to-repair-us-navy-ship-2025-8>

forces can sustain operations even under pressure. It also aligns with strengthening Department of Defense's push for distributed logistics and contested sustainment in the Indo-Pacific.⁸²⁾ For South Korea, hosting these functions not only strengthens its role as a frontline ally but also creates a credible stake in regional stability.

2) Alliance Modernization and Industrial Integration

MRO cooperation also reflects a deeper trend of alliance modernization, moving beyond traditional security guarantees toward industrial and technological integration. Historically, the U.S.-ROK alliance was defined by asymmetry: the U.S. provided extended deterrence, while South Korea relied heavily on American arms sales and troop presence. Today, however, South Korea's defense industry is increasingly seen as a partner rather than a client, capable of sustaining U.S. assets as well as producing indigenous systems.

Joint MRO projects institutionalize this shift. They embed cooperation into long-term industrial frameworks that are less politically volatile than troop deployments or burden-sharing negotiations. For Washington, investing trust in South Korean firms signals confidence in Seoul's industrial maturity. For Seoul, participation in allied sustainment chains elevates South Korea's status within the alliance. Moreover, MRO cooperation complements broader initiatives such as the South Korea-U.S. Integrated Defense Dialogue, which emphasizes defense science and technology integration.

This industrial integration also creates economic spillovers. South Korean firms gain access to high-value contracts and advanced maintenance standards, while U.S. forces benefit from cost-effective and geographically proximate services. Over time, this could establish South Korea as a regional MRO hub, competing with Japan, Australia, and Singapore. The strategic consequence is a more interdependent alliance, where industrial ties reinforce security commitments.

82) US DOD, "Joint Press Statement for the 25th Korea-U.S. Integrated Defense Dialogue" (September 24, 2024). <https://www.defense.gov/News/Releases/Release/Article/3915402/joint-press-statement-for-the-25th-korea-us-integrated-defense-dialogue/>

3) Deterrence, Interoperability, Signaling

At the strategic level, MRO cooperation strengthens both deterrence and alliance credibility. By ensuring rapid and reliable sustainment, the alliance demonstrates that its forces will remain operationally ready in a crisis, undermining adversary expectations of attrition. The ability to repair U.S. and ROK assets in South Korea itself enhances interoperability, as shared logistics systems and standards reduce friction in joint operations. Equally important is the signaling dimension. When U.S. naval vessels undergo refits in South Korean shipyards, or when American helicopters are maintained by South Korean engineers, adversaries perceive a visible symbol of allied trust and integration. This is particularly significant in the context of North Korea's asymmetric threats and China's maritime assertiveness, both of which test alliance cohesion. By embedding sustainment cooperation into alliance structures, Washington and Seoul send a clear message to the rest of the world that their partnership is not limited to rhetoric or temporary deployments but is rooted in long-term industrial collaboration.

4) Trade-off and Risks

Despite its benefits, MRO cooperation is not without trade-offs. South Korea must navigate the tension between alliance integration and strategic autonomy. Overreliance on U.S. platforms for MRO contracts could constrain Seoul's ability to diversify its defense industrial ties, especially with European or Southeast Asian partners. Meanwhile, U.S. export control regimes—such as ITAR—still limit the extent of technology transfer, leaving South Korea dependent on American approvals for servicing advanced systems.

Competition also poses risks. As Japan and Australia expand their own MRO facilities, South Korea faces pressure to maintain cost competitiveness and technical excellence. Failure to do so could relegate South Korea to a secondary role in regional sustainment networks. Finally, adversaries may interpret alliance industrial integration as escalatory, prompting countermeasures such as targeting MRO facilities in crisis scenarios.

Nonetheless, one of the most risks associated with South Korea participating in MRO cooperation with the US Navy is the heightened likelihood that South Korean shipyards would become targets of attack in the event of a U.S.-China conflict. If bilateral cooperation between South Korea and the U.S. expands beyond auxiliary and logistic vessels to include surface combatant, aircraft carriers, or nuclear-powered submarines, it would almost certainly raise concerns about explicit targeting, making South Korean facilities more vulnerable in a wartime scenario.

4. Conclusion

The expansion of South Korea's MRO capabilities carries important policy implications for Seoul, Washington, and the broader U.S.-ROK alliance. For South Korea, the development of advanced MRO infrastructure represents a pathway to strengthen defense industrial autonomy and reduce dependence on foreign sustainment. Establishing facilities such as the planned F-35 heavy maintenance depot at Cheongju Air Base by 2027 will allow South Korea to internalize capabilities previously outsourced to overseas hubs. Until now, ROK Air Force relied on overseas facilities such as the US-Japan depot at Misawa and the Australian depot at Williamtown for deep level F-35 maintenance, creating long turnaround times and logistic vulnerabilities. Bringing this capability onto South Korean soil will not only enhances operational efficiency and availability of Seoul's fifth-generation fleet while reducing alliance dependence on distant hub. Also, the position of South Korea is integrated into the global defense MRO network, elevating its status as both a regional provider and a "global pivotal state."

For the United States, leveraging South Korea as a forward MRO hub offers strategic advantages in the Indo-Pacific theater. By shifting certain sustainment activities from distant U.S. or Pacific Island facilities to South Korea's world-class shipyards and aerospace centers, Washington can reduce turnaround times, increase resilience against adversary disruption, and maintain a more flexible and distributed force posture. Such integration also helps the U.S. mitigate domestic industrial shortfalls by tapping into allied capacity without compromising on quality or reliability.

As of 2025, there is no formally institutionalized trilateral MRO cooperation framework between the United States, South Korea, and Japan. However, trilateral defense dialogues increasingly address logistics, interoperability, and defense industrial cooperation. Bilateral sustainment frameworks such as Acquisition and Cross-Servicing Agreements (ACSAs) and combined logistics arrangements provide a legal foundation for potential future expansion into trilateral MRO cooperation. Besides, South Korea and Japan possess distinct strengths and industrial foundation in MRO, making their capabilities highly complementary. South Korea excels in the maintenance and overhaul of large naval platforms, while Japan holds advantages in precision electronics and sensor-related MRO. Their geographic dispersion further enhances the survivability and resilience of allied maintenance networks in times of crisis or conflicts, and their industrial and technological supply chains offer different components and processes that support a more diversified and distributed sustainment system.

In any case, for the Alliance, expanding MRO cooperation modernizes the partnership beyond traditional deterrence frameworks. It embeds the alliance in long-term industrial and technological collaboration, providing a stable foundation less susceptible to short-term political tensions over cost-sharing or troop levels. By ensuring that allied forces can be repaired, sustained, and deployed seamlessly, MRO integration enhances both the credibility of deterrence and the sustainability of joint operations. Ultimately, this shift transforms the alliance from a primarily military deterrent arrangement into a resilient, technologically integrated partnership capable of addressing prolonged competition in the Indo-Pacific.

V. CONCLUSION

Kuyoun Chung

This study demonstrates that maritime maintenance, repair, and overhaul (MRO) cooperation is no longer a peripheral logistical activity but has become a central pillar of alliance management, industrial strategy, and Indo-Pacific deterrence. Against the backdrop of China's unprecedented shipbuilding scale, persistent U.S. naval maintenance bottlenecks, and intensifying geopolitical competition, MRO capacity has emerged as a strategic asset shaping both the operational readiness of the U.S. Navy and the broader architecture of allied resilience in the Indo-Pacific.

The comparison among the United States, Japan, and South Korea highlights a shared strategic logic—forward sustainment reduces readiness gaps and operational downtime—but also reveals divergent political-economic constraints that shape the scale and direction of alliance industrial integration. Japan provides decades of institutionalized repair capacity, geographic proximity to the Western Pacific, and a mature defense-industrial base. Yet demographic pressures, strike vulnerabilities, and legal limits on foreign MRO constrain its ability to scale further. South Korea, by contrast, offers unmatched industrial efficiency, world-class commercial-military shipbuilding integration, and rapidly strengthening ties with the U.S. Navy. South Korean shipyards have already demonstrated the ability to deliver high-quality, cost-efficient repairs within shorter timeframes, thereby offering a complementary—and in some cases superior—option for U.S. forward sustainment.

At the same time, political economy frictions on both sides of the Pacific limit the expansion of U.S.-ROK MRO cooperation. In Washington, defense contractors and congressional stakeholders view sustainment as a high-margin market and resist offshoring repair work that threatens domestic rents. Regulatory barriers such as ITAR restrictions, facility-clearance requirements, and statutory limitations on foreign shipyard involvement further constrain the scope of cooperation. In Seoul, demographic decline, strategic vulnerability to North Korean and Chinese missile threats, and the need for compliance-oriented infrastructure raise the costs of expanding MRO capacity.

Despite these constraints, the structural logic for deeper MRO cooperation continues to strengthen. The U.S. defense industrial base cannot meet its own sustainment demands; China's naval power projection continues to accelerate; and Indo-Pacific contested logistics conditions require distributed, redundant, and resilient repair networks. South Korea's industrial advantages, Japan's geographic positioning, and the emerging American recognition of allied capacity underscore that forward sustainment will define the next phase of alliance industrial integration. Notably, even incremental MRO cooperation generates long-lasting institutional effects: shared standards, integrated workforce training, cross-border technology management, and embedded sustainment infrastructure create material interdependence that stabilizes the alliance even during political fluctuations.

Ultimately, this report concludes that MRO cooperation is a test case for the future of alliance resilience—one that requires managing political-economy asymmetries, aligning domestic incentives, and institutionalizing industrial interdependence. The alliances that can coordinate production, sustainment, and repair will be best positioned to preserve deterrence and operational advantage in a rapidly changing Indo-Pacific strategic environment.

Building on the preceding analysis, this chapter proposes a stepwise roadmap to structure the way forward and anchor the chapter's concluding recommendations.

- Phase 1: Regulatory Alignment and Bilateral Foundations

The first phase focuses on harmonizing the legal, regulatory, and procedural foundations that underpin cross-border sustainment. MASGA's political logic places new expectations on allies to supplement U.S. maritime capacity, making it important for Seoul and Tokyo to streamline export controls, classification protocols, workforce access, and quality-assurance standards that governs the maintenance of U.S. naval assets. Bilateral channels - ROK-U.S. and U.S.-Japan- should serve as the primary vehicles for this alignment, building upon existing ACSAs, host-nation support agreements, and standing working groups on logistics and sustainment. During this phase, each ally would map its industrial capabilities, workforce constraints, and infrastructure limits in consultation with U.S. Navy Systems Commands, producing

shared, data-driven understanding of where bilateral repair and overhaul activity can realistically expand.

- Phase II: Bilateral Deepening and Pilot Interoperability Projects

Once regulatory clarity and bilateral frameworks are established, the second phase centers on expanding practical cooperation. For the ROK-U.S. dyad, this may involve targeted expansion of destroyers and auxiliary-class MRO conducted at South Korean shipyards, beginning with maintenance categories that the U.S. Navy already performs overseas - primarily hull, mechanical, and electric work - before expanding to more sensitive system. For the U.S.-Japan dyad, pilot project might include high-precision electronics and combat system calibration, where Japan retains a comparative advantage. To test combined interoperability, both dyads should conduct synchronized maintenance cycles on selected U.S. platforms, using shared digital maintenance log, standardized inspection codes, and common certification procedures. These pilot projects serve to identify technical friction, bureaucratic bottleneck, and political sensitivities while obtain experiences for trilateral cooperation.

- Phase III: Trilateral Synchronization and Distributed Sustainment Architecture

In the final phase, bilateral experiences are woven into a trilateral MRO architecture. Rather than creating a single, unified maintenance hub, the United States, South Korea, and Japan would establish a coordinated network of complementary nodes: South Korea specializing in large-platform hull, mechanical and electrical work; Japan focusing on precision systems and high-end electronics; and the U.S. facilities managing nuclear propulsion and sensitive weapons technologies, for example. This trilateral MRO platform will be sustained by existing security and defense agreements between three countries both bilateral and trilateral format, thereby strengthening the resilience of alliances. Such an architecture operationalizes MASGA's call for forward, flexible, and allied-supported sustainment while distributing risk geographically and technically.

Together, these three phases chart a realistic yet ambitious pathways for transforming MRO from a series of bilateral agreements into a trilateral sustainment network that strengthen the readiness, reduces operational downtime, and enhances the alliance's collective capacity to withstand the pressures of great-power competition in the Indo-Pacific.

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