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The Role of South Korea* in regional security: A network analysis perspective

Iryna Shalaginova, Brendan Howe

Abstract

East Asia's security order remains stable but is increasingly strained by the escalating rivalry between the United States and China, characterized by economic decoupling and ideological competition. Despite the challenges posed by this power struggle, enhanced middle powers (herein referred to as second-tier powers) have an opportunity to redefine their roles and help shape a new regional security framework. This article examines South Korea's potential to act as an enhanced middle (second-tier) power network broker within East Asia's security architecture. The Republic of Korea (ROK)'s geostrategic position is constrained by the predominance of more powerful states, limiting its ability to expand within traditional security networks. Confronted with a high-threat environment, particularly in balancing North Korea and navigating U.S.-China tensions, the ROK has historically hesitated to fully align with the exclusive security networks of either power. However, ultimately, in the traditional security domain, it has felt compelled to abandon hedging and reaffirm its commitment to the United States. Nevertheless, South Korea holds significant potential to contribute as a broker between various states and across fragmented security networks in the realm of non-traditional security (NTS). This article identifies the conditions that can either enable or restrain South Korea's capacity to assume such a role, including its motivations for actorness, network dependencies, social capital, and external conditions. By analyzing these variables, the article delineates the domains in which South Korea is most likely to succeed as a regional network broker.

***Key words**: middle powers, second-tier powers, network broker, network security, non-traditional security*

* South Korea and the Republic of Korea (ROK) are used interchangeably in this article.

Introduction

Despite its essentially contested nature, the security order in East Asia[1] has been surprisingly peaceful.[2] Nevertheless, it faces challenges due to the changing geopolitical environment and the escalating rivalry between the United States (U.S.) -- the most critical military ally for many Asian countries -- and China, an indispensable economic partner. China's assertive behavior since 2008, coupled with its challenge to U.S. global dominance,[3] has intensified the rivalry between these two great powers, particularly after the COVID-19 pandemic began in early 2020.[4] This conflict is marked by growing economic decoupling in trade, capital markets, and technology, alongside an ideological and systemic rivalry in which China seeks to reshape the international system to create a China-centric global or at least regional order.[5] As a result, the U.S.-China relationship is entering a phase characterized by intense competition and "escalating strategic paranoia."[6]

The situation worsened as the U.S. began stepping back from global commitments under President Donald Trump. The first Trump administration's rejection of multilateralism significantly undermined global governance.[7] Although President Joseph Biden attempted to reverse some of Trump's withdrawals, he could not restore international trust. A second Trump presidency now threatens to further erode U.S. international commitments, evidenced by moves to defund or exit key institutions like the Green Climate Fund, the World Health Organization (WHO), the Paris Agreement on Climate Change, and others. Such actions will severely impact the world's most vulnerable populations.[8]

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1) This paper adopts Howe's understanding of East Asia which includes both Northeast and Southeast Asia. Brendan Howe, "East Asian Security Cooperation Shortcomings and Opportunities for Second-Tier Actors in the Region," Journal of East Asian Affairs, Vol. 36, No. 1 (Autumn, 2023), pp.39-78

2) Timo Kivimäki, The Long Peace of East Asia (Abingdon : Routledge, 2016)

3) Simona A. Grano, "China-US Strategic Competition: Impact on Small and Middle Powers in Europe and Asia," in Simona A. Grano and David Wei Feng Huang, eds., (Cham:PalgraveMacmillan,2023), p.7

4) Brian G. Carlson, "US-China Strategic Competition in Each Domestic Context," in Grano and Huang, eds., China-US Competition, p.53; Dongsoo Kim, "Changes in International Relations and U.S.-China Relations in the Age of COVID-19," The Korean Journal of Security Affairs, Vol. 25, No. 2 (Winter, 2020), p.78

5) Grano, "China-US Strategic Competition" p.56

6) Hoo Tiang Boon and Sarah Teo, "Caught in the Middle? Middle Powers amid U.S.-China Competition," Asia Policy, Vol. 17, No. 4 (Autumn, 2022), p.61; Jiyong Zheng, Hao Xue and Xingxing Wang, "Restructuring the World Order: China's Perspective," The Korean Journal of Security Affairs, Vol. 27. No. 1 (Summer, 2022), p.9

7) Thomas Weiss, "The UN and Multilateralism under Siege in the 'Age of Trump'" Global Summitry, Vol. 4, No. 11 (Summer, 2018), p.1

8) Sebastian Haug, Anna Novoselova, and Stephan Klingebiel, Trump's Assault on Foreign Aid:

Domestically policies, including dismantling United States Agency for International Development (USAID) and the forced repatriations of migrants, have exacerbated the challenges for marginalized individuals and groups.

While the rivalry between major powers presents various challenges, it also offers opportunities for other strategic actors to redefine their role in the region and contribute to shaping a new security order. As U.S.-China rivalry intensifies, attention has turned to the influence and capacity of middle powers. Scholars have identified various roles middle powers may take in this geopolitical context, such as hedging,[9] seeking to be a "smaller great power,"[10] aspiring to become a regional power, acting as "niche powers,"[11] or "leading from the middle."[12] Some of these actors, however, may differ from traditional middle powers both quantitatively (in terms of their capabilities and status in power hierarchies) and qualitatively (in terms of their policy agendas and niche diplomatic outputs). These powers are referred to as second-tier powers. This article aims to employ network theory to investigate the roles of middle powers and second-tier powers as "brokers" in the evolving regional security order.

Some studies have used network analysis to investigate the role South Korea can play as a network hub, particularly in navigating the 2017-18 North Korea nuclear crisis,[13] aligning with networks led by great powers,[14] or illustrating its status as a middlepower.[15] This article goes further in examining and advocating for a more autonomous security role for middle powers with the greatest resources. It extends network theory into the realm of international relations, identifying the various roles a "broker" can play and outlining the conditions that enable or constrain brokerage. The theoretical framework is then applied to a case study of South Korea, allowing for an in-depth analysis of the country's potential to act as a

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Implications for International Development Cooperation, IDOS Discussion Paper 4/2025 (Bonn : IDOS, 2025), p.14

9) Boon and Teo, "Caught in the Middle?" p.69

10) Giacomello and Verbeek, "Middle Powers as the Ugly Ducklings" pp.7-8

11) Shin-wha Lee and Chun Young Park, "Korea's Middle Power Diplomacy for Human Security: A Global and Regional Approach," Journal of International and Area Studies, Vol. 24, No. 1 (Summer, 2017), p.26; Giacomello and Verbeek, "Middle Powers as the Ugly Ducklings" pp.7-8

12) Lee and Park, "Korea's Middle Power Diplomacy" p.26; Thao, "Middle Powers in the Indo-Pacific," p.433

13) Iain Watson, "South Korea's Changing Middle Power Identities as Response to North Korea," The Pacific Review, Vol. 33, No. 1 (Autumn, 2018), p.22

14) Kuyoun Chung, "Recalibrating South Korea's Role and Regional Network in the Indo-Pacific: An Analysis from a Network-Centered Approach," Asian Politics & Policy, Vol. 15, No. 1 (Winter, 2023), p.23

15) Sangbae Kim, "Roles of Middle Power in East Asia: The Perspective of Network Theories of World Politics," in Seungjoo Lee and Sangbae Kim, eds., Korea's Middle Power Diplomacy: Between Power and Network (Cham : Springer, 2022), p.29

regional security broker. This approach highlights the specific areas in which Korea is most strategically positioned to fulfill such a role.

The ROK has been selected for this analysis because, while recognized by scholars as a middle power through various approaches—positional/behavioral approaches,[16] behavioral/functional approaches,[17] constructivist approaches,[18] alternative definitions of a sovereign state that sits between great powers[19]—it has quantitatively and qualitatively distinguished itself from its peers. In hierarchical power measurement terms, South Korea has long surpassed the status of a middle-ranked power. Although it has a relatively small territory compared with global powers and its population falls in the middle range, its military and economic might are significantly greater than its hierarchical standing would suggest. The country has approximately 550,000 active service men and women, ranking eighth globally; when including reserves, its total service personnel of 3,699,000 is second only to that of Vietnam. Its defense budget exceeds US$50 billion, placing it in the top 10 worldwide.[20] Hence, South Korea's military ranks sixth in the world. Furthermore, South Korea ranks in the top 10 countries in terms of gross domestic product (GDP) and is one of only eight states with over a population of 50 million and a GDP per capita exceeding US$30,000.

Thus, South Korea has outgrown its middle power status, evolving into a second-tier power. Unlike traditional middle powers, which have fewer resources but aspire to influence global norms, second-tier powers possess greater capacity but lack similar global ambitions. They differ from rising powers in that they do not seek, or no longer seek, great power status and remain aware of their strategic limitations. Instead of aspiring to global leadership, they are better characterized as responsible regional actors rather than idealistic global players.[21] The second-tier powers have the potential for considerably more strategic autonomy on the regional stage and can pursue niche diplomacy that maximizes their strategic effectiveness in terms of resources. The ROK can be considered to belong,

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16) Umut Aydın, "Emerging Middle Powers and the Liberal International Order," International Affairs, Vol. 97, No. 5 (Autumn, 2021), p.1379

17) Tanguy Struye de Swielande, "Middle Powers in the Indo-Pacific: Potential Pacifiers Guaranteeing Stability in the Indo-Pacific?" Asian Politics & Policy, Vol. 11, No. 2 (Spring, 2019), p.191

18) Giampiero Giacomello and Bertjan Verbeek, "Middle Powers as the Ugly Ducklings of International Relations Theory," in Giampiero Giacomello and Bertjan Verbeek, eds., Middle Powers in Asia and Europe in the 21st Century (Lanham : Lexington Books, 2020), p.7

19) Albert Sanghoon Park, "Beyond Great Powers: Middle Power Paths to Resilient Multilateralism," Asian Journal of Peacebuilding, Vol. 10, No. 1, (Spring, 2022), p.136

20) Evan Hecht, "World's biggest military: Top 10 list by budget, active and reserve members," USA Today, August 27, 2022

21) Brendan M. Howe, "The Rise, Fall and (Potential) Rise Again of East Asian Middle Powers," East Asian Policy, Vol. 15, No. 4 (2023), p.125

therefore, to a second-tier power category resting below the top tier of established great powers and aspirants, but more important for regional security architecture considerations than any other category of actor.[22)]

Increased actorness through network brokerage

Network theory identifies two key positions that enable a state's "actorness": access—the extent to which a state is embedded in institutional networks—and brokerage—whether states can bridge different networks.[23)]

Access is characterized by the density and frequency of a state's institutionalized relations. States with more connections to others within a network wield greater social power. It enables them to leverage material and ideational connections for influence within the system, gain better access to resources and information, and set agendas and define rules in international organizations, while also conferring coercive power to withhold benefits, enact sanctions, or use diplomatic coercion against less central states.[24)] States often cluster around powerful allies, seeking security in numbers and aligning themselves with central states for indirect access to their allies. Major powers, in particular, actively pursue alliances with nonaligned states to enhance their global influence or prevent them from joining opposing coalitions.[25)] This dynamic is reflected in the formation of traditional security-focused minilaterals—informal initiatives comprising three to five like-minded states "intended to address a specific threat, contingency or security issue,"[26)] typically led by one great power. Network analysis suggests that while access can provide opportunities for influence, it can also impose constraints on a state's autonomy. The dynamics within networks are rarely one-sided, and states involved in alliances may find themselves in unwanted conflicts, trade ties can be utilized for economic coercion, and normative bonds may be employed for compliance enforcement.[27)] For middle and second-tier powers to enhance their actorness, increasing their access may not always be a viable strategy, as they will

22) Howe, "East Asian Security Cooperation."

23) Stacie E. Goddard "Embedded Revisionism: Networks, Institutions, and Challenges to World Order," International Organization, Vol. 72, No. 4 (Spring, 2018), p.764

24) Goddard, "Embedded Revisionism" pp.769-770; Clung, "Recalibrating South Korea's Role," p.24

25) Zeev Maoz, "Preferential Attachment, Homophily, and the Structure of International Networks, 1816-2003," Conflict Management and Peace Science, Vol. 29, No. 3 (Summer, 2012), pp.343-347

26) William Tow, "Minilateral Security's Relevance to US Strategy in the Indo-Pacific: Challenges and Prospects," in He Kai ed., Contested Multilateralism 2.0 and Asian Security Dynamics (New York and London : Routledge, 2020), p.50.

27) Emilie M. Hafner-Burton, Miles Kahler and Alexander H. Montgomery, "Network Analysis for International Relations," International Organization, vil.63, No. 3 (Summer, 2009), p.570

inevitably be overshadowed by more powerful states.

Brokerage positions within institutional orders, on the other hand, refer to acting as bridges between different subgroups within the international system or possessing exclusive connections with marginalized or weakly connected states or groups of states. Brokerage power is determined by betweenness centrality where an actor serves as a link between numerous other actors in the network.[28] This positioning allows states to exert influence by providing the only link to a larger network, which provides them with unique resources and power outside the existing order, enabling them to mobilize new allies.[29]

Traditionally, it has been argued that a brokerage position is only feasible in fragmented networks characterized by structural holes, where some connections are strong and institutionalized, while others are weak, informal, and irregular.[30] Obstfeld et al. argue, however, that "brokerage can occur in a wide variety of structural context, including closed, dense networks," though such structures tend to have fewer brokers compared to fragmented networks.[31] Moreover, a structural hole between two actors does not necessarily imply that actors are unaware of each other; rather, it often indicates that they are primarily focused on their own concerns,[32] such as states primarily preoccupied with national affairs.

Therefore, network scholarship differentiates between brokerage as a structure and as a process. The structural conceptualization of brokerage emphasizes the importance of structural holes[33] and focuses primarily on maximizing nonredundant contacts to enhance information flow through these structural holes or distinguishing between primary and secondary contacts to allocate resources more strategically. A structural entrepreneur can succeed by terminating costly ties and forming advantageous ones, ultimately reaping the benefits of these strategic adjustments.[34] In dynamic environments, however, such as inter-state relationships,

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28) Stanley Wasserman and Katherine Faust, Network Analysis: Methods and Applications (Cambridge : Cambridge University Press, 1994), p.188

29) Goddard, "Embedded Revisionism," pp.769-771; Hafner-Burton, Kahler, and Montgomery, "Network Analysis," p.571-572

30) Stacie Goddard, "Brokering Change: Networks and Entrepreneurs in International Politics," International Theory, Vol. 1, No. 2 (Summer, 2009)," p.258-259.

31) David Obstfeld, Stephen P. Borgatti, and Jason Davis, "Brokerage as a Process: Decoupling Third Party Action from Social Network Structure," in Daniel J. Brass, Giuseppe (Joe) Labianca, Ajay Mehra, Daniel S. Halgin and Stephen P. Borgatti, eds., Contemporary Perspectives on Organizational Social Networks (Bingley : Emerald Group Publishing, 2014), p.139

32) Ronald S. Burt, *Brokerage and Closure: An Introduction to Social Capital* (Oxford : Oxford University Press, 2005), p.16

33) Seok-Woo Kwon, Emanuela Rondi, Daniel Z. Levin, Alfredo De Massis and Daniel J. Brass, "Network Brokerage: An Integrative Review and Future Research Agenda," *Journal of Management*, Vol. 46, No. 6 (Spring, 2020) p.1095

34) Ronald S. Burt, *Structural Holes* (Cambridge : Harvard University Press, 1992), pp.67-69

where connections represent not just information channels but also contextual and relational strengths, multiple links may be essential.

Brokerage can enhance not only communication but also trust, credibility, and legitimacy, fostering collaboration rather than competition.[35] A state may strategically select its network connections to maximize net benefits through exchanges. If it finds its current network unsatisfactory, it may try to restructure the network, opt for different connections, or modify less beneficial networks.[36] Consequently, networks serve as a strategic tool that an actor can deliberately shape to achieve its own objectives.[37] In the process of restructuring the networks, brokers may merge diverse elements to drive innovation and ensure a robust response to external disruptions,[38] which highlights the importance of the process of brokerage rather just the structure of a network.

Brokerage as a process can be understood through broker's behavior, such as *transfer*, *coordination*, and *matchmaking*. In transfer brokerage, the broker manages the exchange of information or resources between disconnected parties without linking them directly.[39] This role may involve translating or filtering information and can vary in intent—from altruistic sharing to opportunistic exploitation—depending on the broker's motivation and skills.[40] In coordination brokerage, the broker mediates interactions in a way that eliminates the need for direct contact between the parties involved. It may involve leveraging or maintaining a gap between two actors for personal gain. The broker benefits by exploiting competition, unfamiliarity, or conflict between the parties, often positioning themselves as indispensable to both sides.[41] In matchmaking, brokers aim to create or strengthen connections between previously unconnected individuals. This matchmaking behavior can either be temporary, with the connection becoming less reliant on the broker over time, or ongoing, where the broker remains a key part of the relationship. Matchmaking fosters collaboration

35) Michael Stohl and Cynthia Stohl, "Human Rights, Nation States, and NGOs: Structural Holes and the Emergence of Global Regimes," *Communication Monographs*, Vol. 72, No. 4, (2005), pp.448-449

36) Chung, "Recalibrating South Korea's Role," p.24

37) Vincent Buskens and Arnout van de Rijt, "Dynamics of Networks if Everyone Strives for Structural Holes," *American Journal of Sociology*, Vol. 114, No. 2 (Autumn, 2008), p.372

38) Ronald S. Burt and Guiseppe Soda, "Network Capabilities: Brokerage as a Bridge Between Network Theory and the Resource-Based View of the Firm," Journal of Management, Vol. 47, No. 7 (Autumn, 2021) p.1712

39) Emma S. Spiro, Ryan M. Acton and Carter T. Butt, "Extended Structures of Mediation: Re-examining Brokerage in Dynamic Networks," *Social Networks,*Vol. 35, No. 1 (Winter, 2013), p.131

40) Obstfeld, Borgatti and Davis, "Brokerage as a Process," p.141-143

41) Spiro, Acton and Butt "Extended Structures of Mediation," p.131; Obstfeld, Borgatti and Davis, "Brokerage as a Process," p.144-145

and often plays a critical role in expanding networks, launching ventures, or supporting collective efforts.[42]

Brokers do not always adhere to a single strategy or behavior; rather, they often combine different approaches depending on the situation, their goals (whether for short-term profit or network positioning), and their motivations (personal gain or collective and community orientation). These strategies may operate concurrently across various areas of the broker's network or shift from one form to another as circumstances change.[43]

Brokers are more likely to develop novel ideas due to their position at the intersection of diverse social and cultural imperatives,[44] blending insights gained from their unique vantage point.[45] They possess both the power and cultural resources to effect change in political systems through their structural position.[46] The innovation and entrepreneurial capacity of brokers may enable them to introduce new norms, manipulate symbols, and significantly influence political outcomes. Specifically, brokers are often identified as the actors most likely to become political entrepreneurs. Successful entrepreneurship depends not only on an advantageous position but also on the ability to effectively exploit power and introduce new ideas.[47] Therefore, a key precondition for brokerage is the motivation to act.

Thus, while the structure of network connections creates the potential for brokerage, this potential alone does not automatically lead to brokering actions. Networks provide the context for action[48] and affect the way brokers carry out their roles, but they do not define the brokers' actions.[49] Even when actors may be limited by their position within a network, they can still actively influence and reshape the network through their own actions.[50] As such, brokers can be seen as network architects, intentionally designing, constructing, and sustaining transactional networks in order to make the best use of the diverse opportunities created by structural holes.[51]

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42) Spiro, Acton and Butt "Extended Structures of Mediation," p.131; Obstfeld, Borgatti and Davis, "Brokerage as a Process," p.147

43) Obstfeld, Borgatti and Davis, "Brokerage as a Process," pp. 139, 149

44) Goddard, "Brokering Change," pp.263-265

45) Cristina Boari and Federico Riboldazzi, "How Knowledge Brokers Emerge and Evolve: The Role of Actor's Behavior," Research Policy, Vol. 43, No. 4 (Spring, 2014), p.685

46) Goddard, "Brokering Change," pp.263-265

47) Goddard, "Brokering Change," pp.257, 266

48) Seok-Woo Kwon, Emanuela Rondi, Daniel Z. Levin, Alfredo De Massis and Daniel J. Brass, "Network Brokerage: An Integrative Review and Future Research Agenda," Journal of Management, Vol. 46, No. 6 (Spring, 2020), p.1096

49) Obstfeld, Borgatti and Davis, "Brokerage as a Process," p.139

50) Boari and Riboldazzi, "How Knowledge Brokers Emerge and Evolve," p.693

51) Timothy G. Pollock, Joseph F. Porac and James B. Wade, "Constructing Deal Networks:

Pollock et al. identify three additional conditions that can enable broker positions in financial markets, which could be applicable to inter-state relationships. First, a broker's effectiveness in managing networks depends largely on their social capital, which facilitates both information flow and the creation of new opportunities. Reputation, strong relationships, and central positioning are among key assets in social capital.[52] When prior connections are absent, the broker's status—reflected in associations with reputable partners—can serve as a substitute for personal credibility.[53] "Social capital" can be described as "an advantage created by the way people are connected."[54] In the context of inter-state relationships, social capital encompasses cultural norms and shared values, established international connections, trust and reciprocity, institutional engagement, and civic participation. Second, a broker's strategy also reflects their dependence on the environment or network. Highly dependent brokers may focus on building long-term value, while less dependent ones may prioritize short-term gains. This dependence can be mutual, granting brokers greater influence in shaping networks when participants rely on them. Finally, external conditions impact network dynamics, with brokers possessing strong social ties being better positioned to adapt to them.[55]

Network theory conceptualizes brokers as entrepreneurs who not only capitalize on fragmented networks but also possess the capacity to restructure them for personal gain or the collective good. The key conditions enabling brokerage include the motivation for actorness (which emphasizes the dynamic nature of brokerage), the state's social capital, network dependency, and external factors. The following section will examine these conditions through a case study of South Korea.

Conditions of South Korea's position as a broker

East Asia currently lacks a comprehensive collective security framework, apart from the largely inactive Six-Party Talks in Northeast Asia and the relatively limited Association of Southeast Asian Nations (ASEAN) Regional Forum. The region's security structure primarily revolves around a "hub-and-spokes" model of bilateral

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Brokers as Network "Architects" in the U.S. IPO Market and Other Examples," Academy of Management Review, vol. 29, no.1 (Winter 2004), p.51

52) Timothy G Pollock, Joseph F. Porac and James B. Wade, "Constructing Deal Networks: Brokers as Network "Architects" in the U.S. IPO Market and Other Examples," Academy of Management Review, Vol. 29 No. 1 (Winter, 2004), p.65

53) Boari and Riboldazzi, "How Knowledge Brokers Emerge and Evolve," p.693

54) Burt, "Brokerage and Closure," p.16

55) Pollock, Porac and Wade, „Constructing Deal Networks," p.66-67

alliances with the United States, the dominant global power.[56] This cooperation has not been sufficiently institutionalized, yielding few tangible results beyond symbolic statements and an inability to effectively influence regional developments.[57] However, the existing security architecture of East Asia creates opportunities for South Korea, as a second-tier power, to broker security networks in order to set agendas on specific regional issues, improve its status as an international actor, and strengthen and improve its relations with other regional players.

Motivation for actorness

South Korea's aspiration to play a more active role in the region has been consistent across different presidencies. Roh Moo-hyun's "balancer" policy sought to enhance Korean autonomy in regional affairs while maintaining the alliance with the U.S. His vision, articulated in *Peace*, *Prosperity and National Security*, prioritized regional peace and prosperity over alliance-centric policies. Roh aimed to position the ROK as a hub between China and Japan by promoting inter-Korean reconciliation, peacefully resolving the North Korean nuclear issue, and building a self-reliant defense.[58] He supported Asian multilateralism through initiatives like the East Asia Vision Group, ASEAN+3, and the Chiang Mai Initiative.[59] His approach sought to shift the U.S.-ROK alliance toward a more equal partnership, allowing Seoul to pursue a more independent foreign policy.[60]

Lee Myung-bak's *Global Korea* policy, while marking a significant shift from the previous administration toward strengthening the ROK-U.S. security alliance, also continued to seek a more autonomous foreign policy. His strategy revitalized the U.S.-ROK alliance, particularly through trilateral cooperation with Japan to deter North Korea, expanded ASEAN+3 into ASEAN+5 by including New Zealand and Australia[61] and employed "hosting diplomacy" to shape global agendas, notably during the 2010 G20 and 2012 Nuclear Security Summits. His administration also focused on strategic niches like development aid, carbon

56) Brendan Howe, "Comprehensive Security and Sustainable Peacebuilding in East Asia: Reflections on Post-COVID-19 Operating Environment," The Korean Journal of Security Affairs, Vol. 25, No. 1 (Summer, 2020), p.7.

57) Ralf Emmers, "The Role of Middle Powers in Asian Multilateralism," Asia Policy, Vol. 13, No. 4 (Autumn, 2018), p.46

58) Seong-Ho Sheen, "Strategic Thought toward Asia in the Roh Moo-hyun Era," in Gilbert Rorman, In-Taek Hyun and Shin-wha Lee, ed., South Korean Strategic Thought toward Asia (New York : Palgrave Macmillan, 2008), p.102

59) Kuyoun Chung, "South Korea's Alignment Shift under the Competition between Coalitional Hegemonies: Elite Ideology, Legitimation, and Role Conception," Australian Journal of International Affairs (Winter, 2025), p.8

60) Scott A. Snyder, South Korea at the Crossroads: Autonomy and Alliance in an Era of Rival Powers (New York : Columbia University Press, 2018), p.141

61) Chung, "South Korea's Alignment Shift," p.8

reduction, and trade liberalization to enhance country's global standing.[62]

Park Geun-hye's foreign policy, while maintaining a strong U.S. alliance like her predecessor, shifted its forcus more toward regional issues. She aimed to address the "Asian Paradox"—economic interdependence amid political tension—through her Trustpolitik initiative, which emphasized building trust while relying on reciprocal actions from others, such as North Korea demonstrating good faith and Japan addressing historical grievances.[63] Park sought closer ties with China to influence North Korea,[64] but growing U.S.-China rivalry limited South Korea's strategic flexibility. In response, she transformed South Korea's role from a balancer to a facilitator, promoting dialogue on soft security issues like nuclear safety.[65]

Moon Jae-in's New Southern Policy (NSP) aimed to realign South Korea's diplomatic priorities and diversify economic and strategic partnerships to mitigate the risks associated with great power rivalry. By deepening ties with India and ASEAN countries, Seoul sought to lessen dependency, expand economic opportunities, and preserve its foreign policy autonomy. The Moon administration took a cautious approach to the escalating U.S.-China rivalry, carefully avoiding any moves that could be perceived as hostile to China. This strategy of "strategic ambiguity" profoundly influenced the NSP's orientation, which focused on less sensitive issues such as economic cooperation, non-traditional security, and human security, largely steering clear of contentious hard security matters like tensions in the South China Sea and the Taiwan Strait.[66]

President Yoon Suk-yeol's *Strategy for a Free, Peaceful, and Prosperous Indo-Pacific Region* advocated for a more proactive role in regional affairs. This strategy aligned closely with the U.S. and other like-minded partners, positioning South Korea as a "global pivotal state" that promotes cooperation based on liberal democratic values.[67] His administration moved away from the concept of being a balancer and towards the role of a facilitator,[68] seeking to transition from being a security beneficiary to a proactive security contributor.[69] This strategy provides "strategic clarity" by aligning more closely with the U.S. through participating in

62) Snyder, "South Korea at the Crossroads", pp.166-168

63) Snyder, "South Korea at the Crossroads",, p.171

64) Chung, "South Korea's Alignment Shift," p.8

65) Chung, "Recalibrating South Korea's Role," p.28

66) Eric J. Ballbach, "South Korea's Evolving Indo-Pacific Strategy: Opportunities and Challenges for Cooperation with the EU." SWP Research Paper, March 2023, p.8-9

67) Chung, "Recalibrating South Korea's Role," p.22

68) Chung, "South Korea's Alignment Shift," p.11

69) Kuyoun Chung, "Polarizing Republican Foreign Policy Visions: Trump's America First and Its Implications for the U.S. Allies," The Korean Journal of Security Affairs, Vol. 29, No. 2 (Winter, 2024), p.18

the U.S.-led Indo-Pacific Economic Framework for Prosperity and joining the semiconductor alliance known as "Chip 4". However, the Yoon administration has not pursued the strategy of strategic decoupling form China, recognizing it remains an important economic partner.[70)]

Thoroughout various administrations, South Korean foreign policy has been characterized by the dual roles of either "balancer" (during progressive presidencies) or "facilitator" role (during conservative administrations). However, the country's foreign policy has consistently been constrained by complex political and economic dependencies in the region.

Social Capital

During Roh's administration, South Korea started expanding its international relations beyond its immediate region, aiming to reduce dependencies while also builing trust and credibility through soft power diplomacy. The ROK's strategy to enhance its global competitiveness shifted toward deeper multilateral and bilateral cooperation. South Korea actively engaged in trade regimes such as the World Trade Organization (WTO), the Asia-Pacific Economic Cooperation (APEC), and ASEAN+3, while also pursuing a variety of bilateral free trade agreements (FTAs) to expand market access. Since unveiling its FTA Roadmap in 2003, Seoul has embarked on negotiations with over 50 countries. Through this intricate network of partnerships, South Korea has reimagined itself as a champion of trade liberalization and an open market economy.[71)]

South Korea has effectively transformed its economic success into a political and diplomatic asset, using development aid to expand its global influence, particularly in the Global South. By integrating Official Development Assistance (ODA) loans with resource development and advancing the Knowledge Sharing Program (KSP), South Korea has elevated its aid policy and soft power. Its development strategy emphasizes shifting from traditional aid to promoting economic growth, knowledge sharing, and development effectiveness.[72)] As only the second Asian member of the Organisation for Economic Co-operation and Development (OECD) Dedevelopment Assistance Committee (DAC) (after Japan), South Korea has positioned itself as an active global player, aligning with global standards such as the Sustainable Development Goals and the Busan Partnership.[73)] Unlike larger powers such as China or Japan, the ROK is not

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70) Ballbach, "South Korea's Evolving Indo-Pacific Strategy," p.18

71) Thomas Kalinowski and Hyekyung Cho, "Korea's Search for a Global Role between Hard Economic Interests and Soft Power", European Journal of Development Research, Vol. 24 (Winter, 2012), p.245

72) Kalinowski and Cho, "Korea's Search for a Global Role", p.243, 250

73) Sojin Lim, "The Evolution Story of South Korea from a Fragile State to an International Actor," in Sojin Lim, Niki J.P. Alsford, eds., Routledge Handbook of Contemporary South

perceived as a geopolitical threat, which allows it to act as a neutral and effective mediator within the DAC. Its enhanced status as a middle power and its diplomatic flexibility have enabled South Korea to engage key players—most notably helping to facilitate China's involvement in the Busan Agreement negotiations. Through initiatives like the Asia Development Forum, the ROK fosters dialogue among Asian donors and recipients while avoiding the tensions that often accompany Sino-Japanese rivalry.[74)]

Additionally, South Korea has also strived to position itself as a leader in environmental cooperation. The Global Green Growth Institute was established at the 2010 East Asia Climate Forum, and in 2012, South Korea secured hosting rights for the Green Climate Fund. Leveraging its experience transitioning from a developing to a developed country to a developed one, South Korea promoted green growth as a model for sustainable development. It framed the climate change sector as a key driver of future growth, backing this vision by financing green projects in developing countries through aid and committing investments to renewable energy.[75)]

During the COVID-19 pandemic, South Korea earned global recognition for its transparent, competent, and collaborative pandemic response. Its testing methods and digital contact tracing were praised as a model for other countries. During this period, the ROK's public diplomacy focused on mutual benefits, providing both material support, such as masks and test kits, and immaterial resources like knowledge, best practices, and policy models. This strategy reflected the idea that public diplomacy in a global crisis must extend beyond self-promotion to foster trust, share expertise, and align national interests with global well-being.[76)]

These accomplishments enhanced South Korea's standing in particular issue areas on the global stage. However, in regional geopolitics, the country is still perceived as a low-profile player compared to more assertive actors like Japan and Australia. Despite diplomatic efforts to strengthen ties with ASEAN through initiatives like the New Southern Policy, Southeast Asia's response has remained lukewarm; a 2022 survey ranked the ROK ninth out of ten countries in terms of regional leadership confidence.[77)] Nevertheless, in non-traditional security (NTS)

Korea (London : Routledge, 2021), p.128

74) Sung-Mi Kim, "International Perceptions of South Korea as Development Partner: Attractions and Strategic Implications," The European Journal of Development Research, Vol. 29, (Winter, 2017) p.1097

75) Moch Faisal Karim, "Middle Power, Status-seeking and Role Conceptions: The Cases of Indonesia and South Korea," Australian Journal of International Affairs, Vol. 72, No. 4, (Spring, 2018) p.357

76) Seow Ting Lee and Hun Shik Kim, "Nation Branding in the COVID‑19 Era: South Korea's Pandemic Public Diplomacy," Place Branding and Public Diplomacy, Vol. 17 (Autumn, 2021), pp. 389, 392

77) Andrew Yeo, "South Korean Foreign Policy in the Indo-Pacific Era." Foreign Policy at

areas, Southeast Asian governments and communities maintain a favorable view of South Korea, bolstered by Hallyu and a preference for collaboration. This positions South Korea as an advocate for developing countries and a potential bridge between the developed and developing worlds.[78)]

Network dependencies

The ROK's network dependencies are closely intertwined with external conditions. South Korea's close alliance with the U.S. and geographical proximity to China contribute to ongoing geopolitical challenges. North Korea, with China's support since the Cold War, presents a constant threat to regional stability, particularly for South Korea. Territorial disputes with China, such as the Socotra Rock maritime conflict, further strain relations. Tensions escalated in 2017 with the deployment of the Terminal High Altitude Area Defense (THAAD) missile defense system in South Korea, which China opposed, fearing that its radar capabilities could target Chinese missiles. Despite assurances from the United States, China imposed economic restrictions on Korean goods and services.[79)]

From Seoul's perspective, Beijing's increasing influence does not pose a direct challenge to the fundamental foundations of the regional order, as China is regarded as a legitimate major power essential for cooperation in addressing the North Korean threat and serving as a vital economic partner.[80)] Nevertheless, China's growing economic and military power, along with its willingness to exert coercion, places the ROK in a challenging dilemma: it must align with the U.S. for security while seeing economic benefits from China, risking tensions with both.[81)] Moreover, the U.S. increasingly views its bilateral alliances in Asia, including with the ROK, as tools to counter China's influence. Washington is urging Seoul to participate in new regional security initiatives, such as the Quadrilateral Security Dialogue (Quad) and the U.S.-led Free and Open Indo-Pacific Strategy (FOIP), while applying pressure to align with its regional security and foreign policies. In response, China has warned Korea against deepening security cooperation with the U.S. and its allies, leveraging its economic influence as the country's top trading partner to pressure Seoul into conforming with Beijing's

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Brookings, Policy Brief, November 2022, p.4

78) Brendan Howe, "Whither South Korean Niche Diplomacy in an Era of Competing Triangulation?" Korea Europe Review: An Interdisciplinary Journal of Politics, Society, and Economics, No. 2 (Summer, 2022), p.8

79) Moch Faisal Karim and Rona Nabila, "Role Conception of the Asia-Pacific Middle Powers: Comparative Analysis of Indonesia, South Korea, Australia and Vietnam," Journal of Asian Security and International Affairs, Vol. 9, No. 2 (Summer, 2022), p.242

80) Matteo Dian, "Japan, South Korea and the Rise of a Network Security Architecture in East Asia," International Politics, Vol. 57 (Spring, 2020), p.193

81) Grano, "China-US Strategic Competition," p.16

interests.[82]

External conditions

The geopolitical challenges of navigating a high-threat strategic environment, managing the North Korea issue, and balancing military and economic security between two great powers[83] are further exacerbated by domestic politics. The ideological competition between conservative and progressive political camps and the role of individual leaders significantly shape foreign policy responses to external conditions. Progressives, emerging from the democratization movement, advocate for engagement with North Korea, closer ties with China, and a more critical stance toward the U.S. and Japan. They view China as vital for sustaining dialogue with the North and reducing tensions, positioning South Korea as a mediator between Washington and Beijing—though this risks greater Chinese influence. In contrast, the conservative tradition in South Korea rooted in the anti-Communist Park Chung-hee era, emphasizes a strong alliance with the U.S., a hardline approach to North Korea, and alignment with Japan.[84] While there is bipartisan support for a stronger global role for South Korea, progress on sensitive issues like inter-Korean relations and ties with Japan requires backing from opposing parties, which remains uncertain in a polarized political climate.[85]

Furthermore, South Korea's ambition to expand its regional role may face pushback from stronger neighbors. Roh Moo-hyun's Northeast Asian Cooperation Initiative, for example, met resistance from China, which opposed South Korea being framed as the "hub of Northeast Asia."[86] Similarly, Park Geun-hye's Northeast Asia Peace and Cooperation Initiative (NAPCI) raised concerns in both the U.S. and China; Washington feared it would overlap with its own regional network, while Beijing viewed it as a challenge to its initiatives, such as the Asian Infrastructure Investment Bank (AIIB) and the Shanghai Cooperation Organization.[87]

Although there are opportunities for cooperation, it is unclear how committed other countries are to forming partnerships with Seoul, especially since closer

82) Linda Maduz, "Explaining Korea's Positioning in the US–China Strategic Competition," inSimona A. Grano and David Wei Feng Huang, eds., China-US Competition (Cham : Palgrave Macmillan, 2023), pp.247-248

83) Ralf Emmers and Sarah Teo, "Regional security strategies of middle powers in the Asia-Pacific," International Relations of the Asia-Pacific, Vol. 15, No. 2 (Spring, 2015), pp.200-201

84) Maduz, "Explaining Korea's Positioning," p.252 and Chung, "South Korea's Alignment Shift," p.2

85) Ballbach, "South Korea's Evolving Indo-Pacific Strategy," p.20

86) Snyder, "South Korea at the Crossroads," p.125

87) Chung, "Recalibrating South Korea's Role," p.28-29

alignment with the U.S. might sideline alternative regional strategies. Despite President Yoon's pivot toward strategic clarity and stronger ties with the U.S., Northeast Asia's geopolitical realities, including China's proximity and Seoul's economic dependence on Beijing, remain unchanged.[88]

Furthermore, there seems to be a discrepancy between how South Korea perceives its role on the global stage and how other countries perceive it. International media coverage of the G20 Seoul Summit from leading English-language newspapers from the U.S., UK, and South Korea revealed that, while the country was widely praised for being an effective host, the media did not view the country as a significant global influencer or as a bridge between developed and developing countries. This contrast between South Korea's ambitions and the perceptions of others highlights the limitations of its Global Korea strategy at that time and underscores the challenges that middle and even second-tier powers face in expanding their influence.[89]

Conclusion and policy prescriptions

Second-tier powers play a crucial role in fostering adaptability through specialized diplomacy, mediation, and bridge-building while implementing innovative approaches. With a solid understanding of regional dynamics and tensions, couple with greater resources, these powers are often better equipped to assume such roles, as they can swiftly recognize challenges and devise solutions more effectively than major powers. Their broad-based power profile continues to bolster their international standing, which enhances their ability to influence the global order. Consequently, these powers can propose alternatives and advocate for reforms that promote system stability, ultimately shaping the global order by influencing leading countries.[90]

South Korea demonstrates a strong motivation for actorness in formulating an autonomous foreign policy, while being acutely aware of its dependencies on the U.S and China. Thus, pursuing a more prominent role in policy realms that are less threatening to major powers, such as NTS issues, offers greater opportunities for the country to further improve its social capital and influence global agendas. Initial policy prescriptions for the ROK's foreign policy may involve bridging security networks in the region through the establishment of minilateral.

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88) Ballbach, "South Korea's Evolving Indo-Pacific Strategy," p.19

89) Stefan Niederhafner, "Honest Broker Korea?: The G20 Meeting in Seoul and the International Perception of South Korea as a Global Actor," International Studies Review, Vol. 15, No. 2 (Winter, 2014), p.51

90) de Swielande, "Middle Powers in the Indo-Pacific," p.194; Howe, "The Rise, Fall and (Potential) Rise Again of East Asian Middle Powers," p.130

partnerships to address specific NTS issues, with the potential to build confidence and trust in the traditional security realm.

This mechanism provides second-tier powers like South Korea with an opportunity to establish a more effective security order in East Asia, "independently of the machinations of great powers."[91] In contrast to multilateral agreements, minilateral partnerships are flexible, entail relatively low transaction costs, and are voluntary in nature. Their manageability makes them a practical alternative to both multilateralism and bilateralism, particularly given the declining U.S. influence.[92] These policy initiatives could take the form of NTS-focused minilateral groups, led by three to five like-minded second-tier states. Alternatively, regional international commissions driven by regional second-tier actors—rather than relying on Western middle powers that may lack relevant contextual understanding—may also offer a viable path forward.[93] Unlike great or rising powers, whose leadership is often met with skepticism, second-tier powers may be better positioned to promote collective international efforts.[94]

While historic existential threats, such as nuclear war, remain, new risks have emerged, including climate change, global health crises, financial instability, trade disruptions, migration, and growing inequality, all of which require collective action.[95] NTS cooperation led by second-tier powers would not only empower East Asian actors but also "remove the great power tensions from NTS security promotion" and "allow for spillover from NTS problem solving to traditional security de-escalation and confidence building by establishing a non-threatening, nonconfrontational cooperative culture of 'yes-ability' in the region."[96] Currently, NTS cooperation in East Asia does not arise as a preventive measure but rather emerges as a response to crises, essentially serving as a "post-crisis outcome."[97] Consequently, NTS institutions are not products of pre-existing ideas or ideologies but are instead developed in response to post-crisis developments in the modern context.[98] South Korea can change this dynamic by taking a more proactive role in tackling NTS issues

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91) Howe, "East Asian Security Cooperation," p.52.

92) Tow, "Minilateral Security's Relevance," p.52.

93) Howe, "The Rise, Fall and (Potential) Rise Again of East Asian Middle Powers," p.131

94) Howe, "The Rise, Fall and (Potential) Rise Again of East Asian Middle Powers," p.131

95) Park, "Beyond Great Powers," p.132

96) Brendan Howe, "Non-Traditional Security Leadership and Cooperation in the Face of Great Power Conflict: The Rise of New Actors." Asian Journal of Peacebuilding, Vol. 10, No. 1 (Winter, 2022), p.264

97) Jaewoo Choo, "Non-Traditional Security Cooperation and Northeast Asian Regional Order," in Elena Atanassova-Cornelis and Frans-Paul van der Putten, eds., Changing Security Dynamics in East Asia (Palgrave Macmillan, 2014), p.180

98) Brendan Howe, "Non-Traditional Security Leadership," p.264

and forming deliberate minilaterals based on a shared understanding of the urgent need for collective action, reinforced by international norms.

This article presents a preliminary theoretical framework grounded in network theory to examine how South Korea, as a second-tier power, can strengthen its regional engagement and influence. It argues that pursuing a more autonomous role within the regional security architecture, while upholding the ROK–U.S. alliance, is not contradictory but rather a strategic approach that aligns with the multiple networks South Korea operates within. Future empirical research identifying structural gaps in the region's security architecture could yield more nuanced and effective policy recommendations for South Korea's foreign policy.

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Trump's EU Strategy and Its Implications for South Korea

Youngill Kwon

Abstract

The Trump administration's shifting approach to Europe can be understood by examining three key factors: threats, interests, and strategy. Instead of prioritizing security cooperation with Europe, the administration shifted its focus toward advancing economic interests and adopted a more confrontational stance toward multilateralism. These changes significantly impacted Europe's security framework and economy, prompting the region to strengthen its independent security framework in pursuit of strategic autonomy. Both South Korea and Europe hold strategic importance in the context of great power competition. However, a key difference lies in their security frameworks: Europe benefits from NATO's robust multilateral security system, while South Korea relies heavily on a bilateral alliance with the United States. This distinction shapes their respective response strategies. For South Korea, it is vital to bolster its alliance with the United States while also learning from Europe to develop its independent security capabilities. In this context, South Korea should draw lessons from Europe's experiences. Strengthening cooperation with Europe in areas such as defense industry collaboration and pursuing strategic autonomy in the international community are essential steps forward.

Key Works:*United States, Europe, NATO, Korean Peninsula, Strategy*

Introduction

Since World War II, the United States (U.S.) has viewed Europe as a critical region for its national interests, prioritizing defense against threats from the Soviet Union. Under the U.S. security umbrella, Europe was able to focus on economic growth, and despite occasional challenges, the bilateral relationship remained relatively stable. After the Cold War, debates emerged regarding the continued existence of the North Atlantic Treaty Organization (NATO). However, the alliance expanded its scope by addressing security issues beyond the Russian threat. A turning point in U.S.-Europe relations came with the Trump administration. The mutually beneficial "win-win" dynamic between the two regions was put into question, as the Trump leadership's perspective on Europe revealed significant shortcomings. This perspective was starkly illustrated in leaked discussions from a Signal chatroom. Before launching an attack on the Houthi rebels, Vice President Vance commented, "3 percent of U.S. trade runs through the Suez. 40 percent of European trade does...I just hate bailing Europe out again." Secretary of Defense Hagseth echoed this sentiment, stating, "I fully share your loathing of European free-loading. It's PATHETIC," openly expressing his dissatisfaction.[1)]

Officials in the Trump administration expressed their unwillingness to tolerate Europe's "free-riding" on U.S. security commitments any longer. This stance is not new; Trump has consistently voiced dissatisfaction with America's security pledges. Nearly 40 years ago, Trump criticized these commitments in a full-page advertisement in U.S. newspapers, questioning the fairness of defending democratic nations. In 1987, he wrote, "For decades, Japan and other nations have been taking advantage of the U.S. Why are these nations not paying the U.S. for the human lives and billions of dollars we are losing to protect their interests? The world is laughing at America's politicians as we protect ships we don't own, carrying oil we don't need, destined for allies who won't help." His perspective has remained unchanged to this day.[2)]

These shifts in U.S. policy toward Europe signify a major change in America's global strategy, which has persisted since World War II. While more time and data are needed to fully grasp the implications, there is a possibility that these changes could outlast Trump's term if prioritizing threats from China remains central. It is of paramount importance to understand why Trump is driving this strategic shift

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1) Rob Picheta, "The Trump administration has harsh words for Europe. In private, they're even harsher" available at https://www.msn.com/en-us/news/world/the-trump-administration-has-harsh-words-for-europe-in-private-they-re-even-harsher/ar-AA1BDywG?ocid=BingNewsSerp (accessed on Apr. 13, 2025).

2) Allan Little, "Trump has blown up the world order - and left Europe's leaders scrabbling" available at https://www.bbc.com/news/articles/c2er9j83x0zo(accessed on Apr. 2, 2025).

and to prepare for its impact not only on Europe but also on South Korea.

The development of U.S.-Europe relations

The relationship between the U.S. and Europe can be broadly divided into two phases based on who leads Europe's security. The first phase spans from the aftermath of World War II until the inauguration of President Trump. During this period, the U.S. implemented the Marshall Plan to rebuild war-torn Europe and established NATO to counter the primary threat posed by the Soviet Union.[3] NATO was a system in which the U.S. guaranteed the security of NATO member states against Soviet attacks, primarily through nuclear deterrence. Following the collapse of the Soviet Union, NATO's primary threat shifted to a weakened Russia, and Eastern European countries began to join the alliance. As the main threat evolved and membership expanded, NATO's original role as a military alliance transformed, leading to a more complex decision-making structure. From the U.S. perspective, the financial burden of its central role in European security since the Cold War necessitated considerations such as NATO members' defense cost-sharing, congressional support for America's global role, and public opinion. Consequently, the U.S. maintained its relationship with Europe largely out of the Cold War inertia.[4]

The United States has expressed discomfort with the possibility of rearmament in Europe, including Germany, while paradoxically criticizing Europe's security dependence on America. This dual stance highlights the complexity of U.S.-Europe relations, where concerns over independent European defense capabilities coexist with frustrations about Europe's reliance on U.S. security guarantees.[5] The United States and NATO advanced their military presence toward Russia's borders, exposing themselves to potential conflict if Russia were to regain strength in the future. NATO's expanded role in addressing threats such as Kosovo, terrorism, Afghanistan, Libya, and piracy marked a significant shift from its Cold War-era focus. This evolution increased the financial burden, complicated threat perceptions, and led to growing dissatisfaction within the U.S. regarding NATO's responses and cost-sharing dynamics.[6] The United States has focused on the immediate use of military force when necessary, while Europe has preferred relying on collective decision-making processes and emphasizing

3) Wesley Truitt, NATO Reconsidered (Santa Barbara : Praeger, 2020), p. 11.

4) Harry Dolton, The Future Role of the United States in European Security: Determining Factors (Rome : NATO Defense College, 1991), pp. 127-132.

5) Moritz Pieper & Martijn Lak, "The End of Transatlanticism," Studies in European Affairs, 4/2019, pp. 30-31.

6) Sarwar Kashmeri, NATO 2.0 (Washington D.C. : Potomac Books, 2011), p. 98.

non-military activities. This divergence in approaches has led to increasing disagreements surrounding NATO's role and operations.[7] Meanwhile, the European Union's role in the security domain has revealed inherent limitations, highlighting challenges in achieving cohesive and effective security strategies within the EU framework.[8]

Moreover, while the United States has contributed the majority of NATO's budget, Germany, despite being a wealthy nation, has failed to fulfill its commitment to allocate 2% of its GDP to defense spending.[9] In the post-Cold War era, globalization weakened Europe's sense of security, exposing vulnerabilities as it began importing oil and natural gas from Russia. Additionally, China's accession to the World Trade Organization (WTO) provided Europe with opportunities to enter the Chinese market but inadvertently accelerated China's economic growth, proving to be a strategic misstep. Russia's annexation of Crimea and its invasion of Ukraine reshaped the relationship between Europe and Russia. Despite differences in values, threat perceptions, and operational procedures, NATO's role has been challenging, especially with Trump's re-election serving as a pivotal moment in this dynamic.[10]

Under Trump's leadership, U.S.-Europe relations took a markedly different direction compared to previous administrations.[11] From a threat perspective, the U.S. shifted its focus away from Russia. Rumors even suggested that Russia had supported Trump's election in 2016, reflecting the amicable relationship between Trump and Putin. For Trump, the primary concern was not Russia but China, leading him to advocate for Europe to take the lead in its own security rather than relying on the U.S. Trump's presidency signaled a deterioration in U.S.-China relations, exemplified by the continuation of a tariff war during his first term. Meanwhile, Europe's relationship with China became increasingly complex. While Europe recognized China as a systemic rival, it also accepted significant investments from China. This situation raises the question of whether Europe's engagement with Chinese investments reflects its own strategic capabilities or China's ability to drive a wedge between the U.S. and Europe. In this context, the United States aims to cut costs while focusing on countering China in Asia. Its

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7) Bruce Stokes, Setting the Table, European Parliamentary Research Service, 2022, p. 26. Available at https://op.europa.eu/en/publication-detail/-/publication/29f3d222-8276-11ed-9887-01aa75ed71a1/language-en (accessed on Mar. 15, 2025).

8) Meltem MÜFTÜLER-BAÇ & Damla CİHANGİR-TETİK, "The United States and the European Union," MARMARA JOURNAL OF EUROPEAN STUDIES, Volume 24, No: 1, 2016, p. 46.

9) Truitt, NATO Reconsidered, p. 31

10) Stokes, Setting the Table, p. ii.

11) The shift in focus from Russia to China or from Europe to Asia began in the early 2010s, marked by the "Pivot to Asia" and growing concerns about Chinese aggression in the South China Sea.

strategy involves excluding China from economic supply chains and blocking the export of advanced technologies to China. Ultimately, the U.S. is shifting toward protectionism by reshoring manufacturing to serve its own interests.

With the weakening of the transatlantic alliance, Europe faces challenges in overcoming obstacles to its multilateral diplomacy and security policies. To address these challenges, Europe seeks to avoid severing ties with NATO; rather, it should strengthen the alliance as a unified strategic entity comprised of diverse perspectives.[12] One of the key issues in U.S.-Europe relations is the debate over whether Europe can achieve strategic autonomy.[13] This discussion revolves around Europe's ability to independently ensure its security and manage its geopolitical interests without relying heavily on the United States. Strategic autonomy has become increasingly relevant as Europe confronts challenges such as shifting U.S. priorities, the rise of China, and security threats from Russia. The outcome of this debate will likely shape Europe's future role in global politics and its approach to multilateralism.[14] The essence of unifying Europe lies in the concept of creating an EU Army. This initiative not only provides stability essential for economic development but also serves as a potential driver for further growth. Europe assesses that it possesses the necessary infrastructure and technological capabilities to achieve this goal. However, the process of reaching consensus among member states remains challenging. In times of crisis, such challenges could act as a catalyst, providing the momentum needed to accelerate the establishment of the EU Army.[15] A notable example is the two EU Battle Groups established in 2007. Despite being prepared for deployment, they have never been activated due to the inability to achieve unanimous agreement among member states. This highlights the challenges of collective decision-making within the EU's security framework.[16]

In summary, U.S.-EU relations can be divided into two distinct phases based

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12) Bjørn Olav Knutsen, A Weakening Transatlantic Relationship?, Politics and Governance, Vol.10, Issue 2, 2022, pp. 170~171.

13) EU strategic autonomy (EU-SA) refers to the EU's ability to act independently without relying on other countries in strategically important policy areas. These areas can include defense policy, the economic matters,, and the ability to uphold democratic values. Mario Damen, "EU Strategic Autonomy," EU Strategic Autonomy Monitor, July 2022, p.1. http://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733589/EPRS_BRI(2022)733589_EN.pdf

14) Moritz Pieper & Martijn Lak, "The End of Transatlanticism," pp. 23-39.

15) Cristian Romeo SPĂTARU & Cristian Constantin POPESCU, A European Defense Force, Analele Universității din Oradea. Seria științe economice, TOM XXXIII, 2nd Issue, December 2024, pp. 210-211.

16) Leonid Bershidsky, "Germany doesn't really want an EU army' available at https://www.bloomberg.com/view/articles/2018-11-19/germany-doesn-t-really-want-an-eu-army(accessedon Mar. 3, 2025).

on changes in threats, U.S. interests, and strategy. In the first phase, the U.S. and Europe shared the common threat of the Soviet Union, and supporting Europe's security against the Soviet Union aligned with U.S. interests for much of the period. Consequently, NATO was established to strengthen military capabilities, and even after the Cold War, NATO expanded its membership and roles. In the second phase, during Trump's presidency, the U.S. shifted its focus from Russia to China as the primary threat. This strategic realignment moved U.S. policy away from being Europe-centered to being China-centered. Winning the competition for dominance against China became the U.S.'s top priority, necessitating concentrated efforts on this front. As a result, Europe faces the challenge of strengthening its strategic autonomy to adapt to this significant shift.

U.S.-EU relations and their implications for Korea

Although Europe and the Korean Peninsula may appear geographically distant and not deeply interconnected, the relationship between the United States and Europe has been a cornerstone of U.S. hegemony. Consequently, changes in U.S.-Europe relations can have global ripple effects, including in Northeast Asia. To assess the impact of these relations on the Korean Peninsula, it is crucial to understand their establishment and evolution as well as the factors influencing these changes. This study examines U.S.-Europe relations through three key elements: changes in threats, U.S. interests, and strategy. Changes in threats refer to the U.S. evaluation of global security threats. U.S. interests encompasses national security priorities that require public support and Congressional backing. Strategy represents the methods employed to safeguard U.S. interests against threats, as outlined in specific public policy directives. While these strategies are primarily focused on Europe, they are closely linked to U.S. strategies in Northeast Asia since they adhere to overarching U.S. Defense Strategy. Therefore, applying lessons derived from U.S.-Europe relations to U.S.-Korea relations provides a relatively objective framework for analysis and understanding.

Although Europe and the Korean Peninsula are both regions where U.S. forces are stationed, they differ significantly in geography, culture, history, economy, and military dynamics. Therefore, directly applying lessons from U.S.-Europe relations to the Korean Peninsula requires caution. However, from the U.S. perspective, the evaluation of threats, interpretation of interests, and selection of strategies to safeguard those interests can be universally applied at a strategic level, regardless of regional differences. The implementation of strategies should consider the unique characteristics of the strategic partners, either Europe or the Korean Peninsula, while the overarching concepts and detailed plans share similarities. This research analyzes these similarities and differences through

literature reviews and case studies. U.S.-European security relations have been maintained through NATO, a military alliance framework. The changing role of NATO is examined in the context of evolving U.S. perceived threats, interests, and strategies, supported by literature reviews that incorporate primary sources such as interviews. While resources related to NATO are relatively abundant, no equivalent collective alliance in Northeast Asia limits the analytical approach. Consequently, the analysis focuses on the U.S.-South Korea military alliance. U.S. policy toward the Korean Peninsula currently emphasizes the perception of China as a threat over North Korea, making research on China an essential component of this study.

This study investigates the impact of Trump's shifting strategy toward Europe on the Korean Peninsula. To do so, it begins by reviewing the formation and evolution of U.S.-European strategies during the Cold War. Then, the study explores the process of redefining U.S.-Europe relations following Trump's rise to power and applies the lessons learned from these changing dynamics to U.S.-Korea relations. While U.S.-Europe relations have largely followed a defined direction, U.S. policy toward the Korean Peninsula remains a work in progress. Therefore, analyzing Trump's strategy regarding the Korean Peninsula through the lenses of threats, interests, and strategy provides valuable insights for shaping future policies in South Korea.

Trump's EU strategy

Trump 1.0

Trump's rise marked a significant departure from the traditional U.S. approach to supporting Europe. Historically, the U.S. believed that the expansion and integration of the EU contributed to peace and stability, aligning with American interests. However, Trump adopted a contrasting stance by expressing support for the United Kingdom's decision to pursue Brexit through a referendum, framing it as an exercise of Britain's sovereign rights independent of the EU.[17] In line with this shift, Trump moved away from the established normative relationship with Europe, criticizing European countries for exploiting the U.S. and emphasizing a more transactional approach. As Robert Zoellick noted, "There was this huge switch; you go from U.S. pursuit of systemic interests to purely transactional policies."[18] This change represented a significant shift in U.S.-Europe relations.

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17) Lawrence Freedman, "The turmoil of Brexit" IISS available at https://www.iiss.org/online-analysis/survival-online/2018/11/trump-and-brexit(accessedon Apr. 13, 2025).

18) Stokes, Setting the Table, p. 29.

The United States' strategic shift stems from a change in its perception of threats. The concept of the "Thucydides Trap," popularized in the 2010s, underscored the power struggle between rising and established powers, foreshadowing a potential U.S.-China confrontation. Many experts began to view China's rise as a challenge to U.S. dominance, raising concerns about America's global standing. Trump's approach, often described as a "stick," became evident through the implementation of tariffs, a policy that contradicted the principles of a free-market economy. The prevailing logic of free-market economics advocates for removing tariffs to facilitate free trade, which is considered efficient according to the theory of comparative advantage. However, Trump prioritized the protection and revitalization of the domestic economy, using tariff threats to safeguard national interests and address trade deficits with Europe. In March 2018, the U.S. imposed a 25% tariff on five types of steel and a 15% tariff on aluminum imported from Europe.[19] Additionally, Trump hinted at the possibility of imposing tariffs on European automobiles. In response, the EU filed a complaint against the U.S. with the WTO and imposed retaliatory tariffs on American goods.[20] Before the tariffs were implemented, the EU, along with other countries, received a postponement that allowed for individual negotiations. However, the EU was unable to reach an agreement by the end of Trump's first term, resulting in the imposition of high tariffs. Consequently, during Trump's presidency, U.S. steel imports decreased by 24%, while aluminum imports dropped by 31%.[21] According to the U.S. International Trade Commission (USITC), despite the tariffs implementation under Trump, the average prices of steel and aluminum in the U.S. rose by 2.4% and 1.6%, respectively.[22] This increase in local steel and aluminum prices negatively impacted manufacturing industries such as construction and automotive parts, highlighting the broader economic challenges associated with these policies.

Trump expressed dissatisfaction with the substantial costs the U.S. incurred for European security while simultaneously suffering trade losses. Through his "America First" policy, he sought to address these issues. At the NATO summit in Brussels in July 2018, Trump criticized allied nations for "free-riding" on U.S. security commitments and even mentioned the possibility of withdrawing from NATO. He strongly urged member states to increase their defense spending contributions.[23] As a businessman, Trump viewed the U.S. covering approximately

19) Vineet Sachdev & Anurag Rao, "What happened the last time Trump imposed tariffs on steel and aluminum" https://www.reuters.com/graphics/TRUMP-TARIFFS/STEEL/gdpznwgdzpw/ (accessed on Feb. 10, 2025).

20) Stokes, Setting the Table, p. 29.

21) United States Internal Trade Commission, "Certain Effects of Section 232 and 301 Tariffs Reduced Imports and Increased Prices and Production in Many U.S. Industries" https://www.usitc.gov/press_room/news_release/2023/er0315_63679.htm(accessedonApr.12,2025).

22) ibid.

70% of NATO's defense budget as unfair and inefficient, especially when addressing threats from China in Asia rather than Europe. The paradox deepened with Brexit, which left 80% of NATO's budget funded by non-European countries, namely the U.S. and the U.K. Trump demanded that member states increase their defense spending from the agreed 2% of GDP in 2014 to 4% by 2024. In 2017, NATO members' defense spending as a percentage of GDP was as follows: the U.S. at 3.6%, the U.K. at 2.1%, France at 2.2%, Germany at 1.4%, Italy at 2.1%, Turkey at 3.0%, Greece at 1.5%, and Estonia at 1.9%.[24] On January 27, 2019, NATO Secretary-General Stoltenberg announced in an interview with FOX News Sunday that NATO defense contributions would increase by a total of $100 billion by the end of 2020.[25]

The National Defense Strategy (NDS) published by the U.S. Department of Defense in February 2018 highlighted no significant changes in Trump's evaluation of threats and responses. It classified China and Russia as revisionist powers and emphasized NATO's strategic importance in countering these threats. The document underscored Russia's potential emergence as a threat and reaffirmed America's security commitments to Europe. In this context, Trump's approach to addressing the threat from China and maintaining U.S. hegemony involved urging Europe to invest more in its defense budget. While Trump's transactional approach to Europe appeared to contradict traditional paradigms and sparked significant backlash, it ultimately strengthened military cohesion between Europe and the U.S. For instance, actions such as the partial withdrawal of U.S. troops from Europe, support for Kurdish forces in Syria, and demands for increased NATO defense contributions encouraged Europe to take a more assertive role on the global stage.[26]

Following the Brexit referendum results in June 2016, the EU Global Strategy for Foreign and Security Policy (EUGS) emphasized the need for Europe to secure strategic autonomy from U.S. security commitments. Brexit also created an opportunity for Europe to deepen military integration within the framework of the Common Security and Defense Policy (CSDP). Additionally, former European Commission President Jean-Claude Juncker proposed a €13 billion European defense fund. On January 20, 2020, European nations reached a political agreement to establish a European maritime surveillance mission in the Strait of Hormuz.[27]

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23) Stokes, Setting the Table, p. 29.

24) NATO, "Defence Expenditure of NATO Countries (2010-2017)" available at https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2017_06/20170629_170629-pr2017-111-en.pdf(accessedon Apr. 2, 2025).

25) William Cummings, "'Trump is having an impact': NATO head credits president's tough talk for $100B boost" available at https://www.usatoday.com/story/news/world/2019/01/27/nato-chief-credits-trump/2695799002/(accessedon Mar. 10, 2025).

26) Ian Bond, "How did US President Donald Trump impact Europe during his four years in office?" available at https://www.euronews.com/2021/01/19/how-did-us-president-donald-trump-impact-europe-during-his-four-years-in-office(accessedon Mar. 15, 2025).

Trump 2.0

Trump's second term continued of his tariff policies, expanding their scope beyond Europe to include all of the United States' trading partners. Under the International Emergency Economic Powers Act (IEEPA), he imposed reciprocal tariffs on several countries: 49% on Cambodia, 36% on Vietnam, 34% on China, 25% on South Korea, and 20% on the EU. A baseline tariff of 10% was implemented on April 5, 2025, with reciprocal tariffs following on April 9. Additionally, a 25% tariff on steel and aluminum went into effect on March 12, and a similar tariff on automobiles started on April 3. Trump also hinted at imposing tariffs on semiconductors. In response to U.S. retaliatory tariffs, China received a warning from Trump regarding an additional 50% tariff on April 7. Meanwhile, the EU announced plans to implement retaliatory tariffs on U.S. goods worth approximately 12 trillion won starting May 1, followed by an additional 28 trillion won in tariffs beginning on April 13. This escalation marked the expansion of Trump's tariff war beyond just China, Canada, and Mexico, not including the EU bloc. Nevertheless, Trump showed a willingness to negotiate tariffs with countries other than China, emphasizing his primary focus on countering China's economic influence. Following the implementation of Trump's tariffs, the stock market plunged, prompting the U.S. government to consider tax credit measures to alleviate the impact of retaliatory tariffs imposed by other countries.[28] This situation highlights the broader economic and geopolitical implications of Trump's tariff policies.

Trump dismissed the EU's proposal for tariff-free trade on U.S. industrial goods, arguing that while tariffs are significant, non-tariff barriers are an even greater issue. He viewed the EU's stringent rules and regulations as tactics to block U.S. access to European markets. The U.S. experiences an annual trade deficit of $350 billion with the EU, and Trump sought to address this by encouraging the EU to purchase more American energy.[29] His tariff strategy was designed to revise EU import rules and regulations while opening pathways for U.S. energy exports. Meanwhile, the EU, concerned about limited access to the U.S. market for electric vehicles (EVs), has been developing government policies and support

27) Anna Dimitrova, The State of the Transatlantic relationship in the Trump Era, The Foundation Robert Schuman, European issues, n°545, 04th February 2020, p. 2. available at (PDF) The State of the Transatlantic Relationship in the Trump Era, Policy paper n°545/2020, Foundation Robert Schuman(accessedonApr.3,2025).

28) Lewis Krauskopf & Saqib Iqbal Ahmed, "US stock market loses $4 trillion in value as Trump plows ahead on tariffs" available at https://www.reuters.com/markets/us/investors-flee-equities-trump-driven-uncertainty-sparks-economic-worry-2025-03-10/(accessedonFeb.10,2025).

29) DPA International, "EU counters President Trump's claims about US trade deficit" available at https://www.msn.com/en-ca/politics/government/eu-counters-president-trump-s-claims-about-us-trade-deficit/ar-AA1xFVUl (accessedon Apr. 5, 2025).

measures to maintain competitiveness in both European and global markets. Interestingly, in the case of EVs, the target of tariffs imposed by both the U.S. and the EU appears to be China. The EU decided to impose additional tariffs of up to 45% on Chinese EVs, on top of the existing 10% tariff, effective from October 30, 2024.[30)]

During Trump's first term, he demanded that NATO member states adhere to the defense spending guideline of 2% of their GDP. However, in his second term, he escalated this demand to 5%. Trump also emphasized that the U.S. would no longer guarantee European security, insisting that Europe must take responsibility for its own defense. His statement, "If they don't pay, I'm not going to defend them," challenged the foundation of collective security outlined in Article 5 of NATO, which had been a cornerstone of European security for over 80 years.[31)] Europe's reliance on U.S. financial support and military capabilities underscored the urgent need to achieve strategic autonomy through significant arms acquisition. During periods of sustained peace, many European states, including the U.K., significantly reduced their defense budgets, reallocating funds to welfare and economic development. For instance, the U.K. plans to increase its defense spending from 2.3% to 2.5% of GDP by 2027, even at the expense of welfare budgets.[32)] However, this alone cannot fill the gap left by reduced U.S. involvement. Beyond budgetary constraints, Europe faces challenges in recruiting military personnel, as younger generations are increasingly reluctant to serve. According to Politico, the EU wants to transition its defense industry onto a war footing, emphasizing the importance of building an independent European defense industrial base capable of producing weapons without reliance on the U.S. It aims to establish a high-level European Defense Industry Group to coordinate procurement and programming, focusing EU efforts and funding on creating a network of cyber defense capabilities and integrated European air and missile defense systems.[33)] Europe can prioritize acquiring these capabilities over the next three to five years while fostering cooperation between national armies and a unified European military to ensure security across the continent.

Indeed, Europe's pursuit of strategic autonomy faces not only technical

30) The Straits Times, "EU to impose tariffs up to 45% on EVs from China" available at https://www.straitstimes.com/world/europe/eu-to-impose-tariffs-up-to-45-on-evs-from-china(accessedon Mar. 20, 2025).

31) Allan Little, "Trump has blown up the world order - and left Europe's leaders scrabbling" available at https://www.bbc.com/news/articles/c2er9j83x0zo(accessedon Apr. 2, 2025).

32) Niamh Foley, "UK to spend 2.5% of gross domestic product on defence by 2027" available at https://commonslibrary.parliament.uk/uk-to-spend-2-5-of-gross-domestic-product-on-defence-by-2027/(accessedon Mar. 10, 2025).

33) Jacopo Barigazzi, Laura Kayali & Joshua Posaner, "EU plans to create defense-industrial complex ready for war" available at https://www.politico.eu/article/eu-plan-war-ready-complex-european-defence-industrial-strategy/(accessedonApr.2,2025).

limitations but also disparities in national interests among its member states. Eastern European countries, being closer to Russia's borders, tend to be more proactive in increasing their defense spending. In contrast, Western European states, which are geographically farther from Russia, remain relatively hesitant to boost their defense budgets. This divergence complicates efforts to achieve a unified and robust European security framework. The EU is intrinsically limited in its ability to consolidate power due to the basic concept of "Coalition of the Willing."[34)]

Summary

Trump's emergence represented a turning point in U.S.-EU relations. From the U.S. perspective, the shift from the traditional threat of Russia to the new challenge posed by China led to a relative decline in Europe's strategic importance. For Europe, which had relied on U.S. security guarantees, this marked a painful moment as a once-dependable ally appeared to drift away. However, while America's focus shifted to China, its interests in Europe did not vanish entirely. If the EU takes on greater responsibility for its own security, there is potential for a healthier and more balanced relationship between the two. Europe faces significant challenges in achieving independent security capabilities: First, it is important to secure defense budgets. While Germany has pledged unlimited increases in defense spending, actual implementation remains uncertain. Eastern European states are proactive in increasing defense budgets, but Western European countries like Spain and Italy prioritize addressing illegal immigration over defense spending. This difficulty in budget allocation reflects a broader challenge in reaching a consensus on deploying European forces in conflict zones. Second, enhancing missile defense capabilities is paramount. To counter threats such as Russian ballistic and hypersonic missiles, the EU urgently needs to develop capabilities in satellite detection, intelligence sharing, and missile interception. While Europe currently relies on the U.S. for these capabilities, achieving independent systems would enable a more autonomous security strategy. Although France maintains nuclear deterrence capabilities, they are limited in reliability against Russia, making continued reliance on U.S. nuclear deterrence likely. Third, the decline in military personnel must be addressed. A combination of declining population and waning interest in military service has made recruitment challenging. Offering incentives for military service could help attract younger generations to the armed forces.

These challenges are not unique to Europe, as the global ripple effects of America's focus on countering China extend far beyond the continent. Continuous

34) Allan Little, "Trump has blown up the world order - and left Europe's leaders scrabbling" available at https://www.bbc.com/news/articles/c2er9j83x0zo(accessedon Apr. 2, 2025).

attention to how Europe addresses these issues will be crucial.

Trump's Change in EU strategy and its implications for South Korea

Implications

Trump's strategy toward Europe was characterized by a level of aggression that raised concerns about the potential collapse of traditional alliances. In contrast, his approach to South Korea did not deteriorate the alliance to the same extent. Trump expressed dissatisfaction with the U.S.'s leading role in supporting Ukraine during the Ukraine-Russia war, preferring that Europe take the lead in military support and countering Russia. However, Europe's reduced defense budgets weakened its combat capabilities. Trump prioritized countering China, which influenced his approach to South Korea. In the U.S. strategy against China, South Korea's geopolitical position and the presence of U.S. troops in the country were deemed crucial—more so than Europe's role in addressing the Russian threat. Unlike Europe, which shifted its focus from the Soviet Union to Russia, South Korea continued to face the persistent threat of North Korea. While Europe reduced defense spending after the Cold War, South Korea maintained its defense budget and developed its defense industry, achieving domestic production of ships, aircraft, self-propelled artillery, and armored vehicles. This positioned South Korea as a valuable ally capable of supporting U.S. interests. Europe benefits from a collective security framework, whereas South Korea operates within the limitations of a bilateral alliance. While bilateral relations effectively address the North Korean threat, the U.S.'s primary concern with China suggests a need to expand its focus. This underscores the importance of trilateral military cooperation among South Korea, the U.S., and Japan. Similar to the EU, which requires improvements in budget allocation and decision-making processes, the U.S.-South Korea-Japan relationship must evolve into a more cohesive and responsive framework. From South Korea's perspective, addressing the North Korean threat remains a priority. However, it is essential to strengthen its capabilities without provoking China, ensuring a balanced approach to regional security.

During Trump's first term, the key issues in U.S.-South Korea relations included the U.S.- North Korea relationship, defense cost-sharing negotiations for U.S. troops stationed in South Korea, and the revision of the Free Trade Agreement (FTA). These issues reflect the U.S. strategy on the Korean Peninsula, which is rooted in the threat posed by North Korea. First, Trump held two summits with Kim Jong-un, Chairman of North Korea's State Affairs Commission. The first-ever U.S.-North Korea summit took place in June 2018 in Sentosa, Singapore, followed by the second summit in February 2019 in Hanoi, Vietnam. The joint statement from the Singapore summit reaffirmed the "Panmunjom Declaration"

from the April 2018 inter-Korean summit, emphasizing the establishment of a stable peace regime on the Korean Peninsula, the recovery and repatriation of war prisoners and missing persons, and the "complete denuclearization of the Korean Peninsula." Critics, however, noted the absence of "complete, verifiable, and irreversible denuclearization (CVID)," which limited the significance of the agreement.[35)]

During his 2024 Republican nomination speech, Trump stated, "I got along with him and we stopped the missile launches from North Korea...He'd like to see me back too. I think he misses me," hinting at the possibility of a future U.S.–North Korea summit.[36)] Second, Trump consistently argued that South Korea should increase its defense cost-sharing contributions, both during his presidency and after leaving office. Defense cost-sharing refers to the expenses paid by the South Korean government for the stationing of U.S. troops in South Korea. Since 1991, South Korea and the U.S. have signed Special Measures Agreements (SMA) every two to five years to determine these contributions. In October 2024, the South Korean government reached an early agreement with the Biden administration to set the 2026 defense cost-sharing contribution at approximately 1.51 trillion won, an 8.3% increase from the previous year.[37)] The agreement also capped annual increases at 5% and linked them to the Consumer Price Index (CPI) growth rate for four years until 2030. While the defense costs for Trump's second term (January 2025–January 2029) have already been determined, there is a possibility that Trump may demand renegotiation or early adjustments. Third, the U.S.-South Korea FTA was the first trade agreement signed by the Trump administration after taking office. During his 2016 presidential campaign, Trump criticized the FTA, claiming it doubled the U.S. trade deficit with South Korea and resulted in the loss of approximately 100,000 American jobs.[38)] He also highlighted the decline of U.S. television manufacturing, contrasting it with the dominance of South Korean TV exports. In 2018, South Korea and the U.S. revised the FTA agreement, extending the tariff elimination deadline for South Korean pickup trucks by 20 years, while considering U.S. regulations on automotive fuel efficiency and greenhouse gas emissions and improving the

35) BBC, "Trump-Kim summit: Deciphering what happened in Singapore" available at https://www.bbc.com/news/world-asia-44451587(accessedon Apr. 13, 2025).

36) The New York Times, "Read the Transcript of Donald J. Trump's Convention Speech" available at https://www.nytimes.com/2024/07/19/us/politics/trump-rnc-speech-transcript.html (accessedon Apr. 13, 2025).

37) Kyle Atwood, "US and South Korea reach tentative agreement on new cost-sharing deal for US troops ahead of potential Trump victory" available at https://edition.cnn.com/2024/10/04/politics/us-forces-south-korea-cost-sharing-agreement/index.html(accessedonApr.13,2025).

38) Time, "Read Donald Trump's Speech on Trade" available at https://time.com/4386335/donald-trump-trade-speech-transcript/(accessedon Apr. 13, 2025).

investor-state dispute settlement (ISDS) system.

Trump's second-term strategy toward Europe, focused on countering the threat posed by China, influences dynamics on the Korean Peninsula. According to the Washington Post, the U.S. defense guidelines emphasize deterring a potential Chinese invasion of Taiwan and defending the U.S. mainland, while accepting risks in other regions. Consequently, the strategy envisions the EU taking the lead in addressing issues related to Russia, while South Korea will be primarily responsible for dealing with threats from North Korea.[39] From this perspective, South Korea can expect to experience similar changes, including increased defense budgets and improved decision-making structures to strengthen security capabilities. The U.S. priorities on the Korean Peninsula, shaped by its focus on countering China, include several key points. First, there is a plan to enhance the strategic flexibility of U.S. forces in Korea. This involves expanding the role of U.S. troops stationed in South Korea, potentially allowing them to be deployed in a contingency in the Taiwan Strait. Reports indicate that Pete Hegseth, the Secretary of Defense in Trump's second administration, has reorganized military roles to prioritize deterring a Chinese occupation of Taiwan, even if it means a reduced focus on Europe and East Asia. If U.S. forces in the Indo-Pacific region concentrate on deterring China, the role of U.S. Forces Korea (USFK) may need to be inevitably redefined. This redefinition might result in a diminished capacity for USFK to respond to conventional threats from North Korea, excluding nuclear and missile capabilities. To address concerns about potential reductions in U.S. troop numbers, South Korea's Defense Ministry has emphasized that USFK's primary role remains to uphold peace and stability on the Korean Peninsula. Ministry spokesperson Jeon Ha-kyou stated, "The biggest role of the U.S. Forces Korea in South Korea is to uphold the peace and stability of the Korean Peninsula, and that will remain unchanged." These developments underscore the evolving dynamics of U.S.-South Korea relations within the broader context of U.S. strategic priorities in the Indo-Pacific.[40]

There are worries about the potential decline in the rapid response capabilities of USFK in case of a crisis on the Korean Peninsula. This concern arises from a potential need for USFK to respond to a possible Chinese invasion of Taiwan, leading to greater strategic flexibility. These issues have been discussed in recent public hearings, including those of the U.S. Senate Foreign Relations Committee. Foreign policy experts at a public hearing urged the U.S. Senate to consult South Korea about the possible use of American forces stationed on the peninsula in potential armed conflicts in the region, such as in Taiwan.[41] The proposal to

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39) Alex Horton & Hannah Natanson, "Secret Pentagon memo on China, homeland has Heritage fingerprints" https://www.washingtonpost.com/national-security/2025/03/29/secret-pentagon-memo-hegseth-heritage-foundation-china/(accessedon Apr. 13, 2025).

40)

refocus USFK's role on countering China was also presented in the 2023 "180-Day Plan" report, authored by over 350 conservative experts, including former Trump administration advisors. Christopher Miller, the former Acting Secretary of Defense, highlighted the importance of prioritizing deterrence against China and increasing the defense contributions of allies. The report proposed that U.S. allies should take on greater responsibility for conventional defense, recommending that South Korea lead efforts in conventional deterrence against North Korea.[42)]

Secondly, there is the demand for increased defense budgets to better deter North Korea. The Trump administration's strategy against China necessitates a concerted response to a potential Chinese invasion of Taiwan, while also managing threats from North Korea. The "Interim National Defense Guidance" accepts risks in other regions, as the U.S. would not want North Korea's threats to escalate. North Korea's nuclear and missile threats pose a challenge for the U.S. and create instability in Northeast Asia. To address this issue, the U.S. is likely to seek resolutions through summits between Trump and Kim Jong-un. Trump had bilateral meetings during his first term and has expressed a positive view of his relationship with Kim. However, from South Korea's perspective, concerns have arisen as Trump refers to North Korea as a nuclear state, suggesting that Trump might temporarily acknowledge its nuclear status while aiming to halt further development. Given North Korea's observation of the situation in Ukraine, it is unlikely that the country would relinquish its nuclear arsenal. Trump's goal would be to prevent the growth of nuclear and missile threats to the U.S., while expecting South Korea to take the lead in addressing North Korea's conventional threats. By securing strategic flexibility for USFK, Trump could pressure South Korea to take the primary role in deterring regional provocations from North Korea, potentially increasing South Korea's security burden. If resource and personnel limitations arise, the U.S. may exert pressure on its allies in Europe and East Asia to increase their defense spending, leading efforts to deter threats from Russia, North Korea, and Iran.

Third, the U.S. may consolidate negotiations with individual countries on defense cost-sharing, trade deficit reduction, Maintenance, Repair, and Overhaul (MRO), and investments in infrastructure projects such as the Alaska pipeline, as part of its strategy surrounding tariff imposition. Unlike its approach with Europe, the U.S. does not seek to alter the U.S.-South Korea alliance; instead, it aims to

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41) Michael Lee, "Washington should ask Seoul about using U.S. troops in Korea in Taiwan contingency, experts tell U.S. Senate" https://koreajoongangdaily.joins.com/news/2025-03-27/national/defense/Washington-should-ask-Seoul-about-using-US-troops-in-Korea-in-Taiwan-contingency-experts-tell-US-Senate--/2272148(accessedonApr.10,2025)

42) Jin-woo Shin, "Will South Korea's defense burden increase? The U.S. reorganizes its military prioritizing "China deterrence" Korean available at https://www.donga.com/news/Inter/article/all/20250330/131309712/1(accessedon Apr. 12, 2025).

address its trade deficit and stimulate domestic investments. In essence, the U.S. seeks a win-win relationship where South Korea meets the needs of the U.S., and vice versa. A notable example of this relationship is the U.S. Navy's limited shipbuilding capacity. To address this issue, the Secretary of the Navy-designate mentioned during a Senate Armed Services Committee hearing that leveraging South Korea's and Japan's shipbuilding capabilities could be a viable solution.[43] This underscores the importance of South Korea's shipbuilding industry to the U.S. Additionally, reports indicate that the U.S. plans to use South Korea's technological investments to construct pipelines that would transport liquefied natural gas (LNG) produced in Alaska to ports, while also exporting LNG to South Korea.[44] However, for South Korea, the success of the Alaska pipeline project presents significant challenges, including securing substantial investment requirements, ensuring technical stability, and securing business viability.

ROK's Strategy

The EU has adopted the pursuit of strategic autonomy as a response to the challenges posed by Trump's policies. Nevertheless, the EU faces the complex task of reaching a consensus among its 27 member states on addressing the military threat from Russia. This requires increasing defense budgets, securing infrastructure for military expansion, and recruiting personnel. Despite having clear strategies and objectives, significant uncertainty remains regarding achieving these goals due to differing priorities among EU member states. Similarly, South Korea finds itself needing to adapt to the shifting priorities of the United States, particularly its new strategy focused on countering China. South Korea has long sought to achieve strategic autonomy on the Korean Peninsula. Like the EU, South Korea remains vulnerable to nuclear and missile threats—from North Korea—and relies on the U.S. nuclear umbrella for protection. Additionally, South Korea faces the pressing issue of declining recruitment for military service, exacerbated by its status as one of the countries experiencing the highest population decline rates globally. In this context, South Korea should focus on strengthening its advantages while systematically addressing and overcoming its weaknesses. This strategy will enable South Korea to navigate the evolving global dynamics more effectively and maintain resilience amid shifting geopolitical priorities.

Compared to the EU, South Korea has consistently increased its defense budget in response to the persistent and escalating threats posed by North Korea. These threats encompass conventional military capabilities and nuclear and missile

43) Jae-seong Lim, "US navy secretary nominee lauds Hanwha's shipyard as way to revive shipbuilding" available at https://www.koreaherald.com/article/10431410(accessedon Apr. 2, 2025).

44) Joshua Gallagher, "U.S. Push for Korean Investment in Alaska LNG" available at https://economy.ac/news/2025/04/20250434141(accessedon Apr. 3, 2025).

programs, as well as cyber and electromagnetic pulse (EMP) attacks. While South Korea, like the EU, relies on the U.S. for protection against nuclear and missile threats, it has been actively working to gain autonomy in managing conventional threats, with plans to gradually strengthen its security capabilities across all domains. Strengthening conventional defense capabilities is achievable through increased defense spending. Despite challenges such as rising protectionism and a low economic growth rate of around 1%, South Korea has continued to bolster its defense capabilities to tackle these tangible threats. However, the issue of population decline remains a pressing challenge. Proposed solutions include integrating artificial intelligence to improve operational efficiency and outsourcing administrative tasks to private contractors, allowing the military to focus solely on combat readiness. This transition is emerging as a key strategy for South Korea's defense modernization.

Secondly, South Korea has significantly strengthened its defense industry capabilities, establishing an efficient industrial infrastructure capable of supplying conventional weapons across various domains. A notable example of this progress is the export of K-2 tanks, K-9 self-propelled howitzers, and FA-50 aircraft to Poland. Experts attribute the success to the superior performance of domestically produced weapons, rapid supply capabilities, and comprehensive support measures. The K-2 tank offers performance comparable to the latest M1A2 tank but is slightly more affordable. Its ability to ford depths of up to 4.1 meters makes it particularly suitable for Poland's river-rich terrain. The K-9 self-propelled howitzer is already familiar to Poland, as the country imported over 120 K-9 chassis in 2014 to produce the "Krab" self-propelled howitzer. The FA-50 light attack aircraft, developed with technical support from Lockheed Martin, features advanced avionics, air-to-air and air-to-ground missiles, along with precision-guided bombs, which further enhances its appeal.[45] Strengthening defense cooperation with Europe provides South Korea the opportunity to import weapons from European states when necessary. A significant portion of the weapons exported to Poland will be manufactured locally. For instance, 180 K-2 tanks will be imported from South Korea, while the remaining 800 units will be produced in Poland starting in 2026. The locally produced model will be named "K-2PL" and will feature enhanced capabilities, such as active protection systems capable of intercepting enemy anti-tank missiles, surpassing the performance of those currently deployed in the South Korean military. Similarly, South Korea will exprt 48 K-9 self-propelled howitzers, with an additional 620 units set to be manufactured in Poland. As for the FA-50 light attack aircraft, all units will be

45) Yong-won Yoo, "Why did Poland choose Korean weapons over those from the U.S. and Germany? The behind-the-scenes of a 40 trillion defense export deal." Korean available at https://www.chosun.com/politics/politics_general/2022/08/05/S3EB3KW3ARFBDIF2SG5HYOYSWA/(accessedon Apr. 3, 2025).

produced domestically in South Korea, with the first batch of 12 aircraft scheduled for delivery next year.[46)]

Thirdly, addressing the threat to Taiwan is a critical aspect of U.S. priorities, as outlined in the Interim National Defense Guidance. The U.S. lists Taiwan's defense against Chinese aggression as a top priority. Consequently, the roles of Japan and U.S. forces stationed in Japan are pivotal in Taiwan's defense. Furthermore, South Korea's contribution, both through USFK and as an ally, is anticipated. This is particularly important since South Korea's maritime trade routes pass near the Taiwan Strait, making it vulnerable in the event of a conflict in Taiwan. To align with the necessity of deterring China, South Korea has established Indo-Pacific strategy departments within its Ministry of Foreign Affairs and Ministry of National Defense. The country has also pursued maritime security policies to enhance its contribution. South Korea's involvement in these efforts could surpass its previous support for Ukraine during the Ukraine-Russia war, which included weapons and supplies. However, these activities will be carried out while maintaining deterrence against North Korea. Given the transactional nature of the alliance, the U.S. may demand reciprocal actions, such as South Korea taking a more active role in regional security, while the U.S. continues to support deterrence against North Korea's nuclear and missile threats. This dynamic underscores the complexity of balancing regional security priorities.

Conclusion

The U.S.'s encouragement of strategic autonomy for Europe does not signify an abandonment of the region; rather, it aims to enable Europe to take primary responsibility for its own security, allowing the U.S. to focus on countering China. Moreover, a Europe that achieves security autonomy could potentially assist the U.S. in its efforts against China. Applying this approach to Northeast Asia reveals both similarities and differences. The similarity lies in the fact that Northeast Asia, like Europe, is a region where the U.S.'s primary threat—China—is located. Thus, cooperation with allies is crucial for the U.S. in this region. Just as in Europe, closer collaboration among allies in Northeast Asia would strengthen their collective capabilities. While the dynamics may not be identical to those in Europe, the U.S. would likely hope for similar functional advancements in the region. The difference, however, is that the U.S. is a direct stakeholder in Northeast Asia. Unlike Europe, the U.S. cannot simply demand that Northeast Asia independently lead regional security efforts. In fact, the U.S.'s demands in Northeast Asia appear to be even greater than in Europe, reflecting the heightened

46) Ibid.

strategic importance of this region.

Just as the U.S. has used tariffs to achieve its objectives with Europe, it is pursuing specific goals in Northeast Asia. By creating the threat and uncertainty of tariff imposition, the U.S. encourages target countries to infer its intentions and present negotiation positions. In trade talks, the U.S. seeks to address trade imbalances and secure returns for providing a security umbrella. For example, in U.S.-South Korea trade relations, the U.S. might demand imports of U.S. crude oil and natural gas equivalent to South Korea's trade surplus or push for investments in projects like the Alaska pipeline or MRO operations for U.S. shipyards. Additionally, the U.S. may call for a substantial increase in South Korea's defense cost-sharing contributions. The U.S. views this strategy as a way to reduce fiscal deficits while sustaining and strengthening the domestic manufacturing sector. Beyond monetary transactions, the U.S. might aim to evolve and enhance the unique nature of the U.S.-South Korea alliance. For instance, South Korea could take the lead in addressing North Korea's conventional threats, while the U.S. focuses on providing a nuclear umbrella to counter nuclear and missile threats. Through negotiations, the U.S. might aim to halt North Korea's nuclear development, acknowledging its current nuclear capabilities, while ensuring that the threat does not escalate further. For South Korea, achieving strategic autonomy may involve developing independent capabilities in areas like multi-domain operations, including intelligence and precision strike measures that currently depend on U.S. assets. Simultaneously, the U.S. could expand the role of USFK to encompass the Indo-Pacific region, including Taiwan, and may expect active participation of South Korean forces. This is because a crisis involving Taiwan would not only affect USFK but also disrupt South Korea's maritime trade routes and potentially require support efforts comparable to or even greater than those seen during the Ukraine-Russia war. Throughout this process, South Korea would need to adopt a wise approach to balance its national interests while avoiding unnecessary provocation toward China.

South Korea relies on the U.S. market and security umbrella, while the U.S. values South Korea's geopolitical significance and advanced manufacturing capabilities in countering China. Trump's vision for winning the competition against China involves reshaping the global order. Both South Korea and the U.S. should prioritize long-term benefits over short-term gains, fostering mutually beneficial negotiations. South Korea is likely to consistently pursue strategic autonomy while ensuring that the U.S.-South Korea alliance remains strong and healthy. Unlike Europe, which experienced neglect in defense after the Cold War, South Korea should maintain its focus on defense and security, adapting to evolving global dynamics while strengthening its partnership with the U.S.

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An Analysis of Lunar Exploration Competition in the New Space Era and Recommendations for Korea's Space Exploration Program

Geunho Song

Abstract

This study aims to provide policy recommendations to support successful implementation of South Korea's planned lunar landing and exploration program. It assesses the implications of the 2032 Moon mission and evaluates the current status and strengths of the country's space capabilities. The analysis situates South Korea's ambitions within the evolving regional and global space landscape, particularly in comparison to recent milestones achieved by regional actors: India's successful Chandrayaan-3 landing on the Moon in August 2023; Japan's SLIM lander mission in January 2024; and China's return of lunar soil samples in June 2024.

Japan, India, and China—alongside the United States, Russia, and the European Union—are widely recognized as advanced spacefaring countries equipped with state-of-the-art space technologies. Japan launched Asia's first satellite in February 1970, followed by China in April 1970 with its first practical satellite, and India in 1980, becoming the sixth country in the world to launch a satellite. In comparison, South Korea entered the space sector relatively late, with significant initiatives beginning in the 1990s.

The sustained investment and technological advancement of Japan, India, and China, particularly in lunar and Martian missions, offer valuable insights for South Korea. Rather than focusing solely on independent exploration, Seoul should prioritize international cooperation with leading spacefaring states to build robust and effective space exploration capabilities.

By thoroughly examining the space technologies and international collaboration strategies of India, Japan, and China, South Korea can build a more resilient and capable space program—paving the way for a successful Moon landing and, ultimately, future participation in Mars exploration missions.

***Keywords**: Lunar exploration, Space cooperation, Space activity, ISRO, KASA, JAXA, CNSA*

I. Introduction

Japan, India, and China—three major lunar exploration countries—have recently achieved significant milestones in space exploration. China launched Chang'e-6 and landed on the far side of the Moon in May 2024, becoming the first country to collect soil samples from the far side and successfully return them to Earth. In January 2024, Japan successfully landed the Smart Lander for Investigating Moon (SLIM). In August 2023, India showcased its space exploration capabilities to the world by successfully landing Chandrayaan-3 near the Moon's south pole — the first such achievement in human history.

To establish itself as a major player in the global space economy, the Republic of Korea has unveiled a comprehensive roadmap targeting a lunar landing by 2032 and a Mars probe mission by 2045. The policy aims to position South Korea as a leader in lunar and Martian exploration, elevate its status as a space technology power, drive the growth of the domestic space industry, cultivate a skilled space workforce , ensure space security, and promote international cooperation.[1)2)]

Since 1990, Korea has actively pursued space development, focusing on satellite technology. A major milestone was achieved with the successful launch of the Nuri space launch vehicle, which established South Korea as the seventh country in the world capable of independently launching a 1.5-ton practical satellite into orbit.

In the New Space era, where private sector companies rather than the government drive space development, advanced spacefaring countries are increasing investments from companies such as SpaceX, Blue Origin, and Firefly Aerospace in satellite launches and space exploration, leading to significant achievements.[3)]

Previously, domestic research on space exploration has largely focused on analyzing the status of lunar exploration, resource development, and space technologies in advanced spacefaring countries. Notable studies on lunar exploration include Joo Kwang-hyuk’s analysis of South Korea's Moon exploration plans and technology capabilities, which traces lunar exploration efforts from the former Soviet Union’s Luna 1 mission through 2014.[4)] Kim

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1) Presidential Office, “President Yoon Announces Future Space Economy Roadmap,” Nov. 28, 2022, https://www.president.go.kr/newsroom/press/Uc8g7TAf (accessedon April 28, 2025).

2) KASA, “2025 Space Development Promotion Implementation Plan,” March 25.

3) Kenza Bousedra, “Downstream Space Activities in the New Space Era: Paradigm Shift and Evaluation Challenges,” Space Policy, Volume 64, 2023, https://doi.org/10.1016/j.spacepol.2023.101553, (accessed on April. 23. 2025).

4) Joo Kwang-hyuk, “Status of Development of Domestic and International Space Exploration Programs and Related Technologies,” 2016, Journal of the Korean Society of Aerospace, 44 (8), pp. 741-758. (accessed on April. 23. 2025).

Kyung-ja emphasized the importance of understanding lunar resources by examining exploration activities undertaken by spacefaring countries in Europea, Russia, the United States, and Asia—from the Apollo program up to 2017—focusing on lunar resources utilization and the construction of lunar bases.[5] Ryu Dong-young discussed the significance of utilizing local resources, such as water ice, oxygen, metals and fuel, to support sustained long-term human presence on the Moon. He underscored the necessity for South Korea to develop and validate resource utilization technologies through international cooperation.[6]

Saadia M. Pekkanen analyzed how Japan has advanced its lunar exploration and space development capabilities since the 1970s. She highlights the central role of the Japan Aerospace Exploration Agency (JAXA) in developing core technologies and implementing national policies. She also notes the growing involvement of private companies, such as ispace, in innovative projects including space resource exploration. Moreover, Pekkanen emphasizes that Japan's future in lunar exploration lies not in its individual efforts but in active participation in international cooperation and promotion of a dynamic domestic space industry.[7] Mathavaraj offers a technical analysis of India's Chandrayaan-3 mission, examining the design of the lunar module, optimized orbital trajectories, and precision in navigation, descent, and landing. His study details the comprehensive orbital planning that enabled the successful landing of India's Chandrayaan-3 lunar module near the lunar South Pole, following the failed lunar landing in 2019. Chandrayaan-3's success is attributed to improvements in orbital design, system optimization, and effective contingency planning. Beyond its technical achievements, the mission is seen as a strategic milestone, significantly enhancing India's role in international lunar exploration.[8] Lin discusses the scientific significance of lunar exploration in the context of China's Chang'e program. He underscores the goals, motivations, and technological innovations of the program, including plans for a future manned lunar landing.[9]

A review of existing literature reveals a notable gap in domestic research on

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5) Kim Kyung Ja, "Lunar resource exploration and lunar base research trends," 2017, Journal of the Rock Society, 26 (4), pp. 378-384. (accessed on April. 23. 2025).

6) Ryu Dong-young, "Global Trends in the Utilization of Space Local Resources," Space Technology and Applications, 2023, pp. 199-212. (accessed on April. 23. 2025).

7) Saadia M. Pekkanen," Japan in the New Lunar Space Race," Space Policy 69(2024), https://www.sciencedirect.com/science/article/pii/S0265964623000449, (accessed on April. 23. 2025).

8) Mathavaraj, "Chandrayaan-3 Trajectory Design: Injection to Successful Landing," Journal of Spacecraft and Rockets Vol.62, No 1(2025) pp. 159–166, https://doi.org/10.2514/1.A35980(accessed on April. 23. 2025).

9) Yangting Lin, "Return to the Moon: New perspectives on lunar exploration," Science Bulletin 69 (2024), pp. 2136−2148, https://doi.org/10.1016/j.scib.2024.04.051 (accessed on April. 23. 2025).

the lunar exploration programs of Japan, India, and China—Asia's leading spacefaring nations with significant recent achievements. Most Korean studies on these countries were conducted prior to 2020. In contrast, international scholarship on these programs is more active and up to date. Japan, India, and China continue to expand their national space capabilities, pursue lunar resources exploration, and enhance space security through technological advancements of lunar exploration and related research activities.

Despite this progress, comprehensive comparative analyses of the lunar exploration efforts of these three countries remain scarce, particularly in light of their recent milestones. Furthermore, there is a critical lack of focused research on South Korea's planned lunar landing program, scheduled for 2032. In the New Space era, characterized by growing private sector involvement, it is imperative that South Korea bolster its lunar ambitions by thoroughly analyzing the strategies and developments of lunar programs in Japan, India, and China.

China, Japan, and India have each made significant strides in space exploration and lunar resource development through the successful execution of their Moon missions. Drawing lessons from their experiences, South Korea should formulate a lunar exploration strategy that is aligned with its own national strengths and strategic objectives.

This study aims to support the development of South Korea's space exploration capabilities, including the design, construction, and operation of a lunar lander, as part of a successful national lunar program. By systematically comparing the lunar exploration trajectories of Japan, India, and China, this research seeks to identify their respective strengths, limitations, and complementary factors. The findings will contribute to shaping a competitive lunar exploration strategy for South Korea, enhancing its prospects of becoming a key player in the evolving global space landscape.

II. Space Exploration Activities, Achievements, and Analysis in the New Space Era

1. Lunar Exploration Activities of Advanced Spacefaring Nations

The advent of the New Space era marks a significant shift in the dynamics of space exploration. This era was defined by the active participation of private-sector actors who, through access to capital and advanced technologies, are increasingly driving innovation and development in the space domain. While government agencies traditionally led space programs, private companies now play a central role in accelerating progress, particularly in the development of future space technologies. As a result, global competition in space exploration has intensified,

with several advanced countries planning manned missions to the Moon and Mars.

Among the key players in Asia, Japan, India, and China have made notable progress in lunar exploration by building on their established satellite and launch vehicle technologies. In May 2024, China's Chang'e-6 mission successfully landed on the far side of the Moon—the oldest celestial body in the solar system—collecting approximately two kilograms of lunar soil and rock samples and returning them to Earth. In January 2024, Japan achieved a successful lunar landing with its Smart Lander for Investigating Moon (SLIM), and, in collaboration with India, is scheduled to launch the Lunar Polar Exploration (LUPEX) mission in 2025. In August 2023, India became the first country to successfully land a spacecraft near the Moon's south pole with Chandrayaan-3, and has since begun development of the Chandrayaan-4 lunar sample return mission.

These developments reflect the active efforts of Asia's leading spacefaring countries in advancing lunar exploration. Meanwhile, South Korea has also entered this domain with the launch of its first lunar orbiter, Danuri, in 2022, which remains operational. The mission is scheduled to be extended through 2027 to conduct detailed surface observations and investigate potential permafrost regions.[10] In addition, South Korea plans to launch and land its first lunar lander by 2032, marking a significant step in its ambitions to join the ranks of spacepowers capable of lunar landings.

2. Scope and Targets of Lunar Exploration Capabilities

The successful realization of South Korea's lunar exploration program depends on the early identification and development of core technologies and capabilities essential for space exploration. Unlike the traditional space race, dominated by state-led large-scale initiatives from the United States and the Soviet Union, the New Space era is characterized by the private sector equipped with cutting-edge space technologies.

To advance its capabilities, South Korea must pursue international cooperation and technological partnerships with established spacefaring countries. Specifically, it should examine Japan's precision landing technologies, India's cost-effective and efficient lunar exploration strategies, and China's capacity to independently develop space exploration technologies.

This study aims to analyze the lunar exploration capabilities of advanced spacefaring countries and to identify the critical technological elements South Korea must develop. This analysis is organized around four key dimensions of space exploration:[11]

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10) Choi Ji-won, "Korea's first lunar probe, Danuri, successfully entered an extended mission orbit," 2025.2.21., *The Dong-A Ilbo*, https://www.donga.com/news/Economy/article/all/20250220/131073984/2. (accessed on April. 23. 2025).

<Table 1> Lunar Exploration Capability Elements and Details

Classification	Element of space exploration capability	Details
Lunar exploration and development capabilities	Space transportation capabilities	Development and acquisition of independent, low-cost, and reusable space launch vehicles for access to lunar and Martian orbits
	Manufacturing capabilities for lunar probes and landers	Ability to develop highly reliable lunar probes and landers, as well as long-term scientific payloads that can be mounted on the landers
	Navigation and precision landing technologies	Space navigation capabilities to send lunar probes to the Moon, along with precision and soft-landing technologies to ensure safe landings on the lunar surface.
	Deep space communication capabilities	Development of a deep space communication system, implementation of deep space internet technology, and operation of international deep space antennas

(1) Space Transportation Capabilities

The ability to independently transport lunar probes into orbit is foundational. South Korea must develop cost-effective and reusable launch vehicles capable of delivering payloads beyond low Earth orbit and accurately inserting them into lunar orbit.

(2) Manufacturing Capabilities for Lunar Probes and Landers

Following successful orbit insertion, the deployment of reliable landers to the Moon's surface is essential. These landers must be capable of conducting surface sample analysis and sustaining long-term scientific missions in extreme lunar environment.

(3) Navigation and Precision Landing Technologies

Given the absence of lunar infrastructure, safe and autonomous landing technologies are vital. Landers must be equipped with advanced navigation systems capable of detecting and avoiding obstacles, as well as reliable hovering and descent control systems.[12] The development of soft-landing technology has become a critical prerequisite for successful lunar missions.

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12) Chun Nam-hyuk to build a Korean-style lunar lander in 2032, "The key is to push back," *The Dong-A Ilbo*, Nov. 17, 2023. https://www.donga.com/news/article/all/20231117/122222639/1. (accessed on April. 23. 2025).

(4) Deep Space Communication Capabilities

Effective lunar missions depend on robust communication between the Moon and Earth. This requires deep space antennas and advanced deep space internet technologies to support data exchange and mission control.

This study proposes the following scope and targets of lunar exploration capabilities as core analytical categories, which serve as a structured framework for evaluating and enhancing South Korea's lunar exploration capabilities.

3. Japan's Space Exploration Strategy and Lunar Exploration Program

Japan has emerged as a key collaborator in global space governance, actively contributing to initiatives such as NASA's Artemis program. Its space exploration strategy emphasizes the advancement of space science and technology and international cooperation. Unlike some of its counterparts, Japan prioritizes robotics and precision science over human spaceflight, leveraging its technological strengths in high-precision landing, autonomous exploration robotics, and remote sensing.

Japan began developing space launch vehicles in 1966 and, in February 1970, became the first Asian country to launched a satellite, Ohsumi, into orbit. Since then, Japan has steadily advanced its space program, often in collaboration with the United States. The Japan Aerospace Exploration Agency (JAXA), which oversees the country's civilian space programs, continues to play a central role in leading various missions.

Despite a recent failure in the launch of the H3, Japan's next-generation launch vehicle developed by JAXA, the country remains a leading power in space launch capability alongside the United States. It operates the H-IIA, a liquid-fueled rocket capable of delivering up to 16 tons to low Earth orbit, and the Epsilon, a solid-fueled rocket capable of lifting payloads of up to 1.2 tons and designed for rapid deployment.[13)]

Japan's lunar exploration began with the launch of Hiten in 1990 aboard an M-3SII rocket. The mission deployed the Hagoromo satellite toward the Moon, completing 10 lunar orbits and conducting critical experiments on lunar orbit navigation.[14)] Hiten was Japan's first lunar mission to achieve a flyby, orbital insertion, and surface impact, concluding with a deliberate impact on the Moon in

13) Kim Kyung-min, "Japan's satellite, carrier, and submarine power, widening the gap with Korea," *JoongAng Ilbo*, September 27, 2019. https://www.joongang.co.kr/article/23588217 (accessed on April. 23. 2025).

14) Hitoshi Mizutani, "The quest for New Adventure," https://global.jaxa.jp/article/special/lunar/mizutani1_e.html, (accessed on April. 23. 2025).

1993.[15]

JAXA's second lunar mission, the Kaguya (SELENE) orbiter, was launched in 2007 aboard an H-IIA rocket. This mission aimed to advance technology for future lunar exploration and to collect scientific data on the Moon's origin and evolutio n.[16]

Most recently, on September 7, 2023, JAXA successfully launched the SLIM aboard a Japanese H-IIA rocket from the Tanegashima Space Center in Kagoshima Prefecture, Kyushu. Weighing approximately 590 kg, SLIM was designed to analyze rocks and other features on the Moon's surface.[17] On January 20, 2024, SLIM achieved a historic precision landing on the lunar surface, landing within 100 meters of its target. This was a significant improvement over earlier missions, demonstrating an accuracy once considered impossible. With this achievement, Japan became the fifth country in the world to accomplish a successful lunar landing, following the United States, the former Soviet Union, China, and India.[18]

In addition to its national missions, Japan is deepening international cooperation with India. After India became the first country to successfully land near the Moon's south pole, Japan is co-developing the Lunar Polar Exploration (LUPEX) mission with the first mission scheduled for launch in 2025. This joint mission aims to search for water resources on the Moon.[19]

JAXA remains at the forefront of Japan's space program, with a focus on cost-efficient technologies. While Japan has advanced precision lunar landing and high-resolution sensor technologies, its long-standing space collaboration with the United States continues to thrive, particularly as a key ally in the Artemis program. The success of SLIM is expected to strengthen the U.S.-Japan cooperation further by contributing critical landing technologies for future lunar missions.

4. India's Space Exploration Strategy and Lunar Exploration Program

India has developed space technology with a focus on low-cost,

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15) https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=1990-007A, (accessed on April. 23. 2025).

16) https://www.selene.jaxa.jp/index_e.htm, (accessed on April. 23. 2025).

17) Park Geon-hee, "Japan's lunar probe 'Slim' successfully entered lunar orbit... scheduled to land on Jan. 20," *Dong-A Science*, 2023.12.26., https://www.dongascience.com/news.php?idx=63043, (accessed on April. 23. 2025).

18) Park Jung-hyun, "'Pinpoint' successfully landed on the moon, 'Slim'..."Doing the mission while turning upside down," *Dong-A Science*, 2024.01.26., https://www.dongascience.com/news.php?idx=63531, (accessed on April. 23. 2025).

19) Park Jung-yeon, "India, the powerhouse of moon exploration, reaches out to Japan... Korea, which has a narrow place for international cooperation," *Dong-A Science*, 2023.09.04., https://www.dongascience.com/news.php?idx=61410, (accessed on April. 23. 2025).

high-efficiency space exploration and is actively advancing its space missions to establish itself as a global space powerhouse. By leveraging its strong scientific and technological workforce, India is implementing a self-reliant and cost-effective strategy that promotes the growth of its private space sector and encourage broader participation.

India's space development began with the establishment of the Indian Space Research Organisation (ISRO) in 1969. Today, India is recognized as a major spacefaring country alongside the United States, Russia, and China, possessing state-of-the-art space technology. In 1980, India became the sixth country in the world to launch a working satellite using its own launch vehicle. The country launched its first lunar probe, Chandrayaan-1, in 2008 and became the fourth country to successfully send a probe to Mars with the Mars Orbiter Mission in 2013.

In 2019, Chandrayaan-2 successfully placed an orbiter into lunar orbit, although its lander failed to achieve a soft landing. To address this setback, India launched Chandrayaan-3, which achieved the first successful landing near the Moon's south pole in August 2023.

India's first satellite was launched in 1980 using the Satellite Launch Vehicle (SLV), followed by the successful deployment of the Polar Satellite Launch Vehicle (PSLV) in 1994. In 2014, India introduced the Geosynchronous Satellite Launch Vehicle (GSLV), capable of placing satellites into geostationary orbit. The GSLV Mk III, India's most powerful rocket, features improved booster and engine thrust, significantly enhancing payload capacity and demonstrating a high success rate.[20)]

India began its lunar exploration in earnest in 2008 with the Chandrayaan-1 orbiter, which contributed to the confirmation of water on the Moon by carrying a NASA payload. In 2019, the Chandrayaan-2 mission's Vikram lander failed to achieve a soft landing and crashed due to excessive thruster use and limitations in its error detection software. ISRO conducted a thorough analysis of the failure and implemented corrective measures.[21)]

Chandrayaan-3, India's unmanned lunar probe, became the first mission in the world to successfully land near the Moon's south pole on August 23, 2023. Immediately after landing, the Pragyaan rover, deployed from the Vikram lander, explored approximately 100 meters of the lunar surface and detected traces of sulfur and various metals.[22)]

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20) ISRO, LVM3(Geosynchronous Satellite Launch Vehicle Mk III), https://www.isro.gov.in/GSLVmk3_CON.html (accessed on April. 23. 2025).

21) Surendra Singh, "Why did Chandrayaan-2 lander fail? ISRO chief gives 3 key reasons for crashlanding, *The Times of India*, 2023. 8.23, https://timesofindia.indiatimes.com/india/why-did-chandrayaan-2-lander-fail-isro-chief-gives-3-key-reasons-for-crashlanding/articleshow/101678204.cms.(accessed on April 24, 2025).

In 2027, India plans to drill up to two meters beneath the Moon's south pole—an area believed to contain water—in order to collect samples and return them to Earth. India also plans to collaborate with Japan on the Chandrayaan-5 mission, which will involve the joint development of a lander and rover.[23] The two countries are also partnering on the LUPEX project, scheduled for launch in 2028, to search for water on the Moon. In this collaboration, India will be responsible for developing the lander, while Japan will provide the launch vehicle, combining their respective strengths in space technology.[24]

Despite its relatively modest space budget, India has conducted highly efficient space exploration by reducing costs through the development of indigenous launch vehicles, a high degree of localization in rocket components, a strong scientific talent pool, and low labor costs. Although the Chandrayaan-3 lander had a limited operational lifespan and was unable to conduct extended exploration missions, India's demonstrated technological capabilities are expected to foster greater international cooperation in future space endeavors.

5. China's Space Exploration Strategy and Lunar Exploration Program

China has established a long-term national plan for space exploration missions and is actively advancing independent deep space missions. While maintaining cooperation with Russia in the space domain, China has also been developing advanced technologies that demand a high level of technical expertise.

China's National Space Administration (CNSA) launched Chang'e 1 in 2007 to map the entire Moon after successfully entering lunar orbit. In 2013, China achieved its first lunar landing with the Chang'e 3 mission, which deployed the Yutu rover for a three-month mission to study the Moon's surface geology. In 2019, China became the first country to land on the far side of the Moon with the Chang'e 4 mission, which deployed the Yutu-2 rover to conduct exploration.[25] In 2020, Chang'e 5 was launched aboard a Long March 5 (CZ-5) rocket and succeeded in collecting lunar rocks and soil samples, which were returned to Earth. A key technological achievement of this mission was the ability of an unmanned lander to return lunar samples, including placing the collected material

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22) Nature, "India's Moon landing is a stellar achievement — and a win for science", Aug. 24, 2023, https://www.nature.com/articles/d41586-023-02685-4 (accessed on April. 23. 2025).

23) Andrew Jones, "India to target moon's south pole with sample return mission," Space News, https://spacenews.com/india-to-target-moons-south-pole-with-sample-return-mission/ (accessed on April 23, 2025).

24) Kim Sun-young, "Japan will seek water from India and the Moon in 2025... China and Russia are working on the "Dal Base Construction" project," *Munhwa Ilbo*, 23.9.7, https://www.munhwa.com/article/11382662, (accessed on April. 23. 2025).

25) Chang'e-4 and Yutu-2, China's mission to the Moon's farside, https://www.planetary.org/space-missions/change-4, (accessed on April. 23. 2025).

in a re-entry capsule, re-entering Earth's atmosphere, and completing a safe landing.[26] The discovery of water on the Moon is believed to significantly increase the potential for establishing human scientific research bases. China's Chang'e 6, launched aboard a Long March 5 (CZ-5) heavy-lift launch vehicle, successfully landed on the far side of the Moon on June 2, 2024—marking the first mission in the world to achieve this feat.[27] On June 25, 2024, the samples collected by the Chang'e 6 probe were returned to Earth in a capsule, representing a significant milestone as China became the first country to retrieve soil samples from the far side of the Moon. Given the communication challenges associated with the Moon's far side, such missions involve considerable risk.

China and Russia are collaborating on the development of a lunar base. The plan includes selecting a construction site by 2025, completing the facility by 2035, and beginning operations in 2036. The base is expected to support studies of the Moon's topography, geology, and internal structure, conduct astronomical observations, and monitor Earth from the lunar surface.[28]

China conducts its space program through the China National Space Administration (CNSA) and has developed independent lunar exploration capabilities, including space launch vehicles, lunar landing technology, sample collection, and sample return systems—all essential components for deep space exploration. Through these lunar missions, China has contributed valuable scientific data and returned lunar samples to Earth.

However, China's space technology is widely believed to have potential military applications, and its space development activities are often characterized by limited transparency. Although China is currently collaborating with Russia on a lunar base project, ongoing technological rivalry between the United States and China may constrain China's opportunities for international cooperation in space.

6. Analysis of Japan, India and China's Lunar Exploration Programs

Japan is recognized as a leading country in international space exploration, owing to its advancement in space science and technology and its active engagement in international space cooperation. Rather than prioritizing manned missions, Japan has developed a space exploration program focused on its strengths in robotics and precision space technology. Its advanced space technologies and contributions to global space exploration are mainly achieved

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26) KARI, "China's plan to land on the moon," https://www.kari.re.kr/totalNewsView.do?id=1002 (accessed on April. 23. 2025).

27) Georgina Rannard, "China's Chang'e-6 robot lands on Moon's far side," *BBC NEWS*, 2 June 2024, https://www.bbc.com/news/articles/cxeejp0y2pjo. (accessed on April. 23. 2025).

28) Park Jung-yeon, "The 'Global Space Cooperation Competition' for the Moon has begun," The *Dong-A Ilbo*, 2023.09.04. https://www.donga.com/news/article/all/20230903/120999010/1. (accessed on April. 23. 2025).

through international collaboration, rather than independent national efforts.

India is emerging as a global space power despite operating with a relatively modest space development budget. This success is attributed to its strong foundation in space science and technology, the development of indigenous launch vehicles, high localization rates for rockets and satellites, and the increasing involvement of skilled scientists and private space companies. The success of the Chandrayaan-3 lander, developed on a low-cost budget, demonstrates India's advanced technological capabilities and has positioned the country as both an advanced spacefaring country and a key partner in international space cooperation.

China is conducting stable and sustained space exploration through a state-led space program managed by the China National Space Administration (CNSA), with key roles played by state-owned enterprises. Unlike Japan and India, which emphasize private sector participation, China's space exploration is largely driven by government and military institutions. China has developed comprehensive lunar exploration capabilities, including launch vehicles, lunar landers, moon probes, landing technology, sample collection, and sample return systems. Through these missions, China has provided scientific data and lunar samples to the international community. However, its closed space development model—partly influenced by concerns over potential military applications—has limited broader international collaboration. Nonetheless, China and Russia are currently cooperating on the development of a lunar base.

III. Evaluation and Implementation Strategy for South Korea's Lunar Exploration Program

1. Current Status of South Korea's Space Exploration Program

(1) South Korea's Space Exploration Program

With the approval of the Fourth Basic Plan for the Promotion of Space Development by the National Space Development Committee, chaired by the Prime Minister, South Korea designated space exploration as a core objective in its effort to become a leading space economy by 2045. The plan outlines the development of indigenous unmanned exploration capabilities and the strategic pursuit of large-scale initiatives—such as manned missions and participation in space stations—through international cooperation. The national roadmap includes completing a Moon landing by 2032 and achieving a successful Mars landing by 2045.[29)]

29) Office for Government Policy Coordination, "Fixed Basic Plan for Space Development," *Republic of Korea Policy Briefing*, 2022.12.21., https://www.korea.kr/news/policyNewsView.do?newsId=148909663. (accessed on April. 23. 2025).

To lead and coordinate national space efforts, the Korea Aerospace Administration(KASA) was established in May 2024. As the central control tower for South Korea's space activities, KASA is responsible for formulating and implementing mid- to long-term plans for space exploration, in alignment with the national roadmap.

(2) South Korea's Space Exploration Capabilities

South Korea successfully launched its first lunar orbiter, Danuri, in 2022, with the mission of observing the Moon's surface and identifying potential landing sites for future missions.[30] With support from NASA, Danuri entered lunar orbit and remains operational, with its initial one-year mission extended through 2027. The orbiter is equipped with the Lunar Terrain Imager (LUTI), developed by the Korea Aerospace Research Institute, which observes the Moon's topography to identify viable landing zones for future lunar landers. In addition, the onboard Shadow Cam, developed by NASA, contributes to the high-resolution mapping of permanently shadowed regions and supports U.S. efforts in future crewed lunar missions. Danuri marks a significant milestone in South Korea–U.S. space cooperation. Danuri is also conducting lunar resource exploration using its gamma-ray spectrometer.

As South Korea prepares to launch a lunar lander in 2032, collaboration with countries possessing advanced space technologies will be essential. India and Japan, both of which have successfully completed recent lunar landing missions, could serve as valuable partners in supporting South Korea's lunar ambitions.[31]

South Korea has also demonstrated competitiveness in the development of cameras and monitoring equipment for lunar probes. Its advanced capabilities in designing instruments capable of analyzing the Moon's surface composition position South Korea as a strong contributor to international cooperation in lunar surface exploration.

To ensure the successful advancement of its lunar exploration program in accordance with the national roadmap, South Korea must analyze the technological developments, experience, and achievements of leading spacefaring countries. Expanding joint research collaborations, promoting international exchanges, and fostering a skilled workforce dedicated to space exploration are essential strategies for enhancing South Korea's capabilities in lunar exploration.

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30) Choi In-jun, "Korea Plans to Land on the Moon by 2032," *Chosun Ilbo*, 2023.8.22., https://www.chosun.com/economy/science/2023/08/22/UJSYPFLRHNHPJKWZVINM4R5JJE/. (accessed on April. 23. 2025).

31) Hannah Ellis-Petersen, "Hopes fade for India's moon lander after it fails to 'wake up' following lunar night," *The Gardian*, Sep 26, 2023, https://www.theguardian.com/world/2023/sep/26/india-chandrayaan-3-vikram-lander-pragyan-sleep-mode-failure (accessed on April. 23. 2025).

2. Challenges and Implementation Strategies for South Korea's Lunar Exploration Program

To ensure the success of its lunar exploration program, South Korea must secure several core space technologies: independent deep space transport capabilities, the ability to develop lunar landers and rovers, precision space navigation and landing systems, and deep space communication infrastructure. While developing these technologies domestically is important, international collaboration with experienced lunar exploration countries remains critical.

(1) Indigenous capability for deep space transportation

A rocket capable of transporting a lunar lander—typically weighing over five tons—to the Moon is essential. Currently, the KSLV-II (Nuri) can place approximately 1.5 tons into low Earth orbit. Accordingly, South Korea is pursuing the development of the next-generation KSLV-III, which is designed to launch payloads of up to 10 tons, enabling the delivery of lunar landers to the Moon. For the Danuri mission, South Korea relied on the U.S.-based SpaceX Falcon 9 rocket due to the unavailability of a domestic launch vehicle capable of deep space missions at that time. Through the development of KSLV-III, South Korea aims to establish cost-effective, high-efficiency launch vehicle technology, including reusable rocket capabilities, to enhance its competitiveness in the global space market.

(2) Capability to Develop Lunar Landers and Rovers

Unlike Japan, India, and China, South Korea has yet to develop a lunar lander. Beginning in 2025, South Korea plans to initiate the development of such a lander by defining specific scientific and technological objectives to be carried out on the lunar surface. The lander will be designed based on South Korea’s accumulated expertise in satellite development and manufacturing.

Since 2022, South Korea has operated the Danuri orbiter in lunar orbit and has collaborated with NASA in identifying resource-rich regions and potential landing sites as part of the Artemis manned lunar landing program. However, South Korea still lacks hands-on experience in the design and production of lunar landers and rovers.

Although development remains in the research phase, South Korea must begin producing prototype modules for both the lunar lander and rover to ensure future mission success. The Moon’s extreme environment, with 14-Earth-day-long cycles of day and night, results in temperature fluctuations of over 200°C, ranging from above 100°C during the day to -130°C at night. Successful missions will require thorough thermal analysis and integration of findings into the design of landers and probes.

Securing advanced thermal control system technology is vital. Since the 1990s, South Korea has developed satellites with effective thermal regulation for harsh space environments. However, the thermal systems for a lunar lander will require more rigorous development and validation. Notably, India's Chandrayaan-3 encountered operational challenges due to extreme cold at the lunar south pole, highlighting the importance of robust thermal engineering.

(3) Precision Space Navigation and Landing Capabilities

Lunar missions require precise descent and landing capabilities following accurate navigation into lunar orbit. Currently, South Korea does not possess independent systems for precision navigation or real-time landing. To address this gap, the development of AI-powered algorithms for high-precision navigation and autonomous decision-making during lunar orbit entry and landing is essential.

Japan's SLIM mission demonstrated advanced precision landing technology, achieving a touchdown within 100 meters of its designated site. This was accomplished through vertical descent from lunar orbit, onboard target recognition, obstacle detection, and adaptive descent control to ensure a safe landing.[32] To secure similar precision landing technology, South Korea should prioritize international cooperation over exclusive domestic development. Achieving a successful lunar landing by 2032 will require collaboration with leading space agencies and technology firms in the United States, Japan, and India.

Given the high failure rate of lunar landing attempts worldwide, South Korea must develop highly sophisticated and reliable landing systems. Strategic partnership with India and Japan—two leading aerospace countries with recent lunar landing successes—will be instrumental in helping South Korea acquire the necessary technological capabilities and confidence to realize its lunar mission goals.[33]

(4) Deep Space Communication Capability

International cooperation with the United States and Australia—countries with established infrastructure for deep space antenna operations and ground station networks—is essential for building South Korea's own deep space communication capacity.[34] Currently, South Korea relies on such partnerships to operate the

32) Lee Hyun-joo, "Japan proved itself as an advanced space country by attempting a precise landing on the moon... to expand exploration areas," *Hankook Ilbo*, 2024.1.20., https://www.hankookilbo.com/News/Read/A2024012007160005376?did=NA. (accessed on April. 23. 2025).

33) Hannah Ellis-Petersen, "Hopes fade for India's moon lander after it fails to 'wake up' following lunar night", *The Gardian*, Sep 26, 2023, https://www.theguardian.com/world/2023/sep/26/india-chandrayaan-3-vikram-lander-pragyan-sleep-mode-failure (accessed on April. 23. 2025).

Danuri lunar orbiter, positioned approximately 380,000 kilometers from Earth. By expanding collaboration with regional partners such as Japan and India, South Korea can further secure access to deep space communication resources. In addition, the deep space internet communication technology successfully tested on Danuri should be leveraged to enhance the country's long-term capabilities in deep space communication.

IV. Conclusion

South Korea's lunar exploration program began later than those of Japan, India, and China—three of the most advanced spacefaring countries—and currently lacks substantial technological capabilities beyond the operation of the Danuri lunar orbiter. Although South Korea has successfully developed and launched numerous Earth observation and communication satellites, and became the seventh country capable of launching over 1.5 tons into orbit with the Nuri launch vehicle, its satellite transport capacity and space exploration technologies for missions beyond geostationary orbit remain limited in comparison to those of leading space states.

To become a true space exploration power, South Korea must engage in collaborative space programs with technologically advanced countries, leveraging its solid foundation in space science and technology. In addition, South Korea must also establish pathways for its young generation of scientists and engineers to acquire space exploration expertise and actively contribute to the space missions of international partners.

South Korea cannot advance its space exploration programs independently. In alignment with the New Space era, the United States has also emphasized the importance of international collaboration through joint technology development and missions, exemplified by the Artemis program. South Korea supports Artemis by operating Danuri's ShadowCam, which captures high-resolution imagery of potential lunar landing sites. Furthermore, South Korea's participation in NASA's next-generation space telescope, SPHEREx, successfully launched in March 2025. has highlighted the country's technological capabilities. Continued active participation in the Artemis initiative will allow South Korea to secure meaningful opportunities for international collaboration. This mutual cooperation is vital, as evidenced by South Korea's current reliance on deep space communication infrastructure located in Spain, the United States, and Australia to operate Danuri.

To conduct successful future lunar exploration missions, South Korea must develop a comprehensive national space exploration plan and secure the necessary

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technologies by studying the expertise and lessons, including failures, of leading spacefaring countries. This study presents the following policy recommendations for South Korea's lunar program:

First, South Korea must secure independent lunar lander launch capabilities by successfully developing the next-generation launch vehicle, KSLV-III, building upon the foundation of the Nuri rocket. While Nuri can deliver a 1.5-ton payload to low Earth orbit (LEO), lunar exploration requires significantly more powerful launch systems. Strengthening South Korea's space transportation capabilities will reduce its reliance on foreign rockets for deep space missions, including those to the Moon and Mars.

Second, South Korea should acquire key space exploration technologies through international cooperation, such as active participation in the Artemis program and the joint development of lunar rovers and exploration missions. With Japan and India already deepening collaboration on rocket development and mission support, South Korea must also strengthen its international partnerships. Sharing exploration missions and jointly developing critical capabilities, including precision landing systems and rover technologies, will allow South Korea to minimize risks and enhance mission reliability. By thoroughly analyzing the lunar exploration programs and missions of other countries, South Korea can extract valuable insights to improve the design and success rates of its own missions.

Japan is currently cooperating with NASA and India on space exploration, while India is enhancing its status as a leading spacefaring country through growing partnerships with NASA, the European Space Agency (ESA), and Japan. To reinforce space exploration collaboration with Japan and India, South Korea should effectively utilize data from Danuri's LUTI imagery and ShadowCam, as well as the joint South Korea–U.S. SPHEREx telescope project.

Third, South Korea must develop core artificial intelligence (AI) and robotic technologies essential for space exploration, including autonomous landing systems, obstacle avoidance, thermal control for landers, rover operation, and sample collection system. Following India's model of cost-effective and localized technology development, South Korea should prioritize building these capabilities to support its long-term lunar exploration goals.

Fourth, cultivating highly skilled scientific personnel is essential for executing future lunar missions. South Korea must operate continuous workforce development programs aimed at training professionals capable of managing international space exploration projects. Expanding participation in joint research and educational exchanges with leading spacefaring countries, such as Japan, India, and the United States, will be key to building a robust talent pipeline.

Fifth, the Korea Aerospace Administration (KASA), as the central coordinating body for national space development, must lead the strategic advancement of South Korea's lunar program. KASA should also play a critical

role in allocating budgets for the research, development, and acquisition of critical exploration technologies, such as precision landing and lander thermal control systems, while also establishing and executing mid- to long-term national policies to ensure the sustainability of South Korea’s space exploration efforts.

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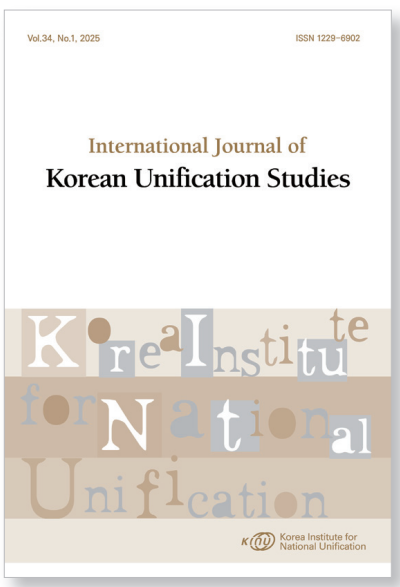

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