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South Korea's Industrial Policy for the New Space Economy

Darcie Draudt-Véjares and Kaylin Kim

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Carnegie Endowment for International Peace
Publications Department
1779 Massachusetts Avenue NW
Washington, DC 20036
P: + 1 202 483 7600
F: + 1 202 483 1840
CarnegieEndowment.org

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Summary

As the new space economy transforms cislunar space into a commercial battlefield for technological supremacy, South Korea's industrial cluster initiative provides critical insights into how late entrants can leverage domestic coordination strengths to compete in domains that eliminate traditional catch-up strategies. Korea's nascent three-hub strategy—which anchors satellite manufacturing in Sacheon, research and talent development in Daejeon, and launch operations in Goheung—leverages the country's time-tested, government-industry coordination model while addressing the unique constraints of the new space economy, where companies must achieve global competitiveness from inception rather than building capabilities through sequential domestic market development. Early implementation shows sharp tensions between Korea's new distributed cluster model and the tight coordination that made its traditional industrial hubs successful. Geographic separation hinders day-to-day collaboration, while governance battles expose deeper questions about whether legacy industrial policy can keep pace with fast-moving, globally networked industries.

Key Takeaways

- Korea's cluster space industrial model addresses three critical barriers that distinguish space development from traditional catch-up strategies: the requirement for immediate global market entry, simultaneous mastery across multiple advanced technology domains, and powerful industrial ecosystem effects that favor early entrants over new participants.

- The geographic separation between major hubs and ongoing institutional conflicts between Daejeon and Sacheon over aerospace administration centralization undermine the intensive government-industry collaboration that enabled Korea's previous industrial successes.
- The defense-space technological convergence that defined the original space race continues to shape how new entrants like Korea must develop capabilities that serve both commercial competitiveness and alliance integration requirements.
- Korea's early experience offers crucial evidence about whether countries with established coordination capabilities can maintain institutional advantages while competing in globally integrated industries that increasingly determine twenty-first-century strategic positioning.

Introduction

South Korea's space industrial cluster initiative represents a critical test of whether proven government-industry coordination mechanisms can adapt to strategic domains that eliminate traditional protected learning environments. Korea's three-hub strategy (see figure 1)—which anchors satellite manufacturing in Sacheon, research and talent development in Daejeon, and launch operations in Goheung—leverages the country's time-tested coordination model while confronting a fundamental challenge: Unlike Korea's shipbuilding, automotive, semiconductor, and defense export industries, which allowed sequential capability building from basic to advanced systems, entering the space economy offers few opportunities for gradual, stepwise technological development. Even the most basic satellites require radiation-hardened components, precision manufacturing, and international regulatory compliance from inception.

This paper examines Korea's current space cluster strategy (2024–2030)¹ as a case of industrial policy adaptation, focusing on how government-industry coordination mechanisms must evolve when traditional catch-up strategies fall short. The initiative commits 380.8 billion Korean won (₩) (\$290 million) to satellite manufacturing, research and development, and launch facilities to help the country catch up in the emerging commercial space race. In contrast to existing analyses that emphasize Korea's space development primarily through security and alliance lenses,² this paper treats the cluster initiative as an economic coordination challenge within today's high-technology competition landscape.

We identify three structural constraints that distinguish space industrial development

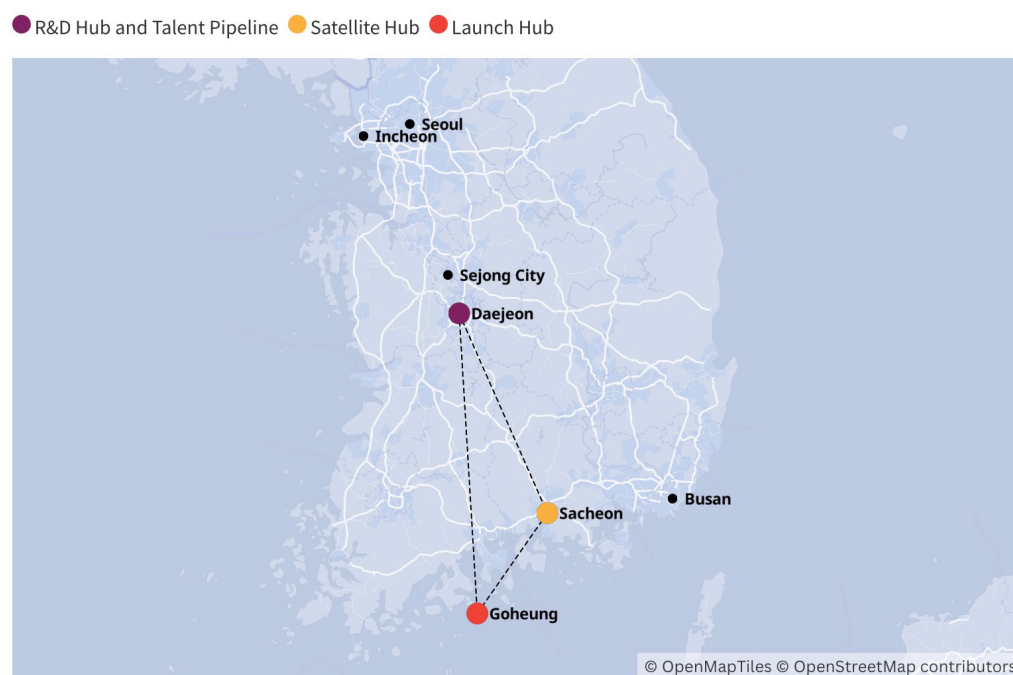
Korea's current cluster framework is built on decades of sustained investment in aerospace research institutes, defense manufacturing capabilities, and launch infrastructure that transcends electoral cycles.

from Korea's previous successes: the requirement for immediate global market entry and regulatory compliance, convergent mastery across multiple advanced technology domains simultaneously, and powerful industrial ecosystem effects where early entrants establish integrated supply chains and research partnerships that create high barriers for new participants. Korea's distributed cluster model represents an innovative but inherently constrained response to these challenges—maintaining coordination advantages while addressing space sector realities that demand immediate global competitiveness.

Space industrial development presents new challenges for Korea to adapt the governance strategy of previous industrial successes. While the current cluster framework was formalized under the Yoon Suk Yeol administration, it builds on decades of sustained investment in aerospace research institutes, defense manufacturing capabilities, and launch infrastructure that transcends electoral cycles, ensuring continuity as Korea transitions to the Lee Jae Myung government's broader strategy of leveraging high-technology sectors for economic revitalization.

The strategy offers critical insights into how new entrants to the space economy can develop sovereign capabilities while participating in industries that demand immediate international integration. This challenge reflects broader transformations in how new space entrants can approach industrial development. The cislunar space domain—stretching from low Earth orbit to the Moon's orbital vicinity—interlocks military, commercial, and scientific purposes in unprecedented ways, opening new economic frontiers where competition operates according to orbital mechanics, space physics, and technological capabilities rather than geography, natural resources, or traditional comparative advantages.

Figure 1. South Korea's Regional Space Cluster Map



Korea's space industrial development strategy uses regional hubs to coordinate government, industry, and research efforts to overcome scalability constraints imposed by small domestic markets and rapid innovation cycles, creating patterns applicable to other high-technology domains where traditional industrial policy approaches confront accelerated competitive dynamics. Early implementation reveals sharp tensions between Korea's distributed approach and the intensive coordination that made its traditional industrial hubs successful, providing critical evidence about the viability of adapting proven coordination mechanisms for globally networked industries. Geographic separation hinders day-to-day collaboration, while governance battles expose deeper questions about whether legacy industrial policy can keep pace with fast-moving, globally integrated industries. Korea's approach creates pathways for deepening economic and technological partnerships between the United States and the Republic of Korea (ROK) beyond traditional security cooperation, while offering insights for other states seeking to align domestic innovation systems with the globalized demands of the emerging space economy, where control over critical technologies shapes future geopolitical influence.

The New Space Economy

The transformation of space from a domain of scientific exploration and national prestige into a commercial economic sphere signals a structural transformation in the geography of high-technology sectors, with space emerging as a new frontier for commercial investment and strategic positioning. Korea's policy community frames these developments within a rapidly changing global environment marked by accelerating private sector innovation and intensified geopolitical competition, as noted in the Fourth Basic Plan for Space Development Promotion, which cites expanding space exploration and commercialization as key international drivers.³ This paper focuses on how Korea—through coordinated efforts between government and industry—is seeking to enter the cislunar economy: the emerging commercial sphere encompassing activities from low Earth orbit to the Moon's orbital vicinity, where proximity to Earth and growing economic feasibility will make sustained operations possible within the coming decades.⁴ To do so, we examine the combined efforts of government and industry to position Korea as a competitive actor in this emerging strategic domain.⁵

The cislunar economy breaks sharply from terrestrial models, operating across a vastly larger spatial scale and demanding new approaches to logistics, infrastructure, governance, and safety. Unlike Earth-based economies, which are shaped by geography and national borders, cislunar space unfolds as a fully three-dimensional domain defined by gravity wells, orbital mechanics, and radiation fields.⁶ Traditional limitations and assets—like fixed locations and transport corridors—are giving way to orbital dynamics and the prospects of accessing vast off-Earth resources.⁷ As a result, achieving a competitive advantage hinges less on territorial control or raw material deposits and more on space domain awareness, technological capability, maneuverability, and strategic positioning.⁸

Proponents of space economic development argue that unlocking in-space resources like lunar ice and solar energy can catalyze a new era of economic expansion and sustainability. Skeptics, however, caution that without robust governance frameworks, rapid space exploitation could exacerbate geopolitical tensions and create new risks around resource competition, environmental degradation, and security dilemmas.⁹ Korea’s approach, grounded in a tradition of state-industry coordination, offers an instructive model for navigating these tensions by balancing commercial viability with strategic and regulatory foresight.

The rapid commercialization of space—characterized by private sector innovation, shortened development cycles, and globally networked supply chains—has fundamentally altered competitive dynamics for new space economy entrants.¹⁰ This shift from the government-led old space era to today’s commercially driven new space economy represents a structural transformation in how space capabilities develop (see table 1). Even so, governments account for up to 70 percent of upstream revenue in Europe as well as Korea.¹¹ This continued government role creates opportunities for industrial policy, but within fundamentally different constraints than traditional sectors.

Table 1. The Space Economy Transformation

	Old Space Economy (1950s–90s)	New Space Economy (2000s–Present)
Leading Actor	Government agencies (U.S. National Aeronautics and Space Administration, Soviet space program)	Private companies (SpaceX, Blue Origin)
Supporting Actors	Major aerospace contractors (Boeing, Lockheed)	Government agencies, venture capital
Funding Source	Unlimited government budgets	Private investment, commercial revenue
Primary Goal	National prestige, military capability	Commercial market leadership, profitability
Market Structure	Closed government procurement	Global commercial competition
Development Timeline	10-to-20-year government programs	2-to-3-year innovation cycles
Success Metrics	Technical firsts, strategic capability	Cost efficiency, market share

Source: Authors’ compilation.

Every satellite, launch, and space service requires global regulatory compliance and competes internationally from inception, eliminating both the technological stepping stones and protected market niches that enabled Korea’s sequential industrial development in other sectors.¹² This reality constrains traditional industrial policy tools and requires governments to focus on enabling immediate global competitiveness rather than sequential market development.

For new space economy entrants like Korea, this creates both unprecedented opportunities and fundamental challenges. The accelerated pace of commercial space markets demands immediate global competitiveness and continuous technological advancement, while traditional space programs were allowed decades for capability development. Countries cannot rely on geographic proximity, natural resources, or established infrastructure to provide competitive advantages—success requires the mastery of advanced technologies and operational capabilities that span traditional industrial development models. This structural transformation is compounded by space domain network effects: Early entrants claim optimal orbital slots, radio frequencies, and operational zones through international agreements, while establishing ground station networks and launch schedules that create physical and regulatory advantages.

Every satellite, launch, and space service requires global regulatory compliance and competes internationally from inception, eliminating both the technological stepping stones and protected market niches that enabled Korea’s sequential industrial development in other sectors.

Moreover, this structural shift creates three critical barriers that distinguish space industrial development from traditional catch-up strategies. First, space operations require simultaneous entry into global supply chains, regulatory frameworks, and operational networks, preventing the domestic market development that typically precedes international expansion in other industries.¹³ Second, successful space economy participation demands convergent mastery of multiple advanced technology domains—from radiation-hardened electronics and autonomous systems to advanced materials and precision manufacturing—eliminating the sequential capability building that characterizes traditional industrial development.¹⁴ Third, the space economy exhibits powerful industrial ecosystem effects¹⁵ where early entrants establish launch systems, orbital positioning, communication networks, and supply chain relationships that create significant barriers for new participants attempting to establish independent capabilities.¹⁶

Industrial Catch-Up Challenges in the New Space Economy: South Korea’s Constraints

The contemporary space economy operates as an exclusive domain where fewer than a dozen nations possess the full spectrum of capabilities—from satellite manufacturing to independent launch capacity—that define meaningful participation (see table 2). This hierarchy reflects four distinct capability tiers based on two critical thresholds: independent launch capacity and advanced satellite manufacturing capabilities. Full space powers maintain complete indigenous capabilities across all domains, while advanced space nations combine

Table 2. Tiers of Space-Capable Nations

Country	Independent Launch	Satellite Manufacturing	First Satellite	Satellites in Orbit as of July 2025***
Tier 1 (Full Space Powers): Complete capabilities across all domains				
China	Yes	Yes	1970	912
Russia	Yes	Yes	1957	1,559****
United States	Yes	Yes	1958	10,082
Tier 2 (Advanced Space Nations): Independent launch + advanced manufacturing				
France	Yes*	Yes	1965	123
India	Yes	Yes	1975	106
Japan	Yes	Yes	1970	206
Tier 3 (Emerging Launch Nations): Developing/demonstrating launch capabilities				
Iran	Yes	Limited	2005	4
Israel	Yes	Yes	1988	15
New Zealand	Yes**	Limited	2020	3
North Korea	Yes	Limited	1998	1
South Korea (transitional to Tier 2)	Yes	Yes	1992	44
United Kingdom	Developing	Yes	1962	658
Tier 4 (Manufacturing and Operations Nations): Advanced satellite manufacturing				
Australia	Developing	Limited	1967	30
Brazil	Developing	Limited	1985	19
Canada	No	Yes	1962	64
Germany	No	Yes	1969*****	82
Italy	Yes*	Yes	1964	67
Netherlands	No	Yes	1974	8
Norway	Developing	Limited	1992	19
Sweden	Developing	Yes	1986	13
Switzerland	No	Yes	2009	13

Source: Authors' own compilation

*Via the European Space Agency and the Ariane program

**Via Rocket Lab (U.S. company)

***Numbers sourced from N2YO. N2YO licenses orbital data from the U.S. Space Surveillance Network/Space-Track, which is managed by the U.S. Department of Defense's Space Command (SPACECOM).

****Russia has a large legacy of defunct satellites and objects in orbit, which is why 1,559 Russian-registered satellites (many nonfunctional) are reported. It is also important to note that N2YO intentionally does not list "Russia" separately under its country filter. Instead, it groups Russian satellites under "Commonwealth of Independent States—former USSR," to avoid splitting historical and current operations into separate country labels.

*****West Germany

Tier Definitions

Tier 1: Full Space Powers: Nations with comprehensive and autonomous capabilities across all domains, including independent launch, advanced satellite manufacturing, and sustained human or deep-space operations.

Tier 2: Advanced Space Nations: Nations with independent orbital launch and advanced satellite manufacturing capabilities, operating mature space programs but without full-spectrum autonomy in human or deep-space missions.

Tier 3: Emerging Launch Nations: Nations developing or demonstrating sustained orbital launch capability with growing but partial industrial and operational depth in satellite manufacturing or launch frequency.

Tier 4: Manufacturing Nations: Nations with advanced satellite design and manufacturing capabilities but no independent launch capacity.

independent launch with sophisticated manufacturing. Emerging launch nations are developing or demonstrating launch capabilities with varying manufacturing capacities, and manufacturing nations possess advanced satellite production without independent launch access.

The space club's exclusivity is evident in that only China, Russia, and the United States maintain complete capabilities across all domains, while a second tier of advanced space nations possesses the minimum threshold of indigenous launch capacity and sophisticated manufacturing. Korea currently occupies the third tier of space-capable nations, making its aspiration to rank among the world's top-five space powers by 2045 a particularly ambitious industrial policy challenge that demands fundamental capability transformation rather than incremental advancement.

Korea achieved its rapid industrialization in the twentieth century through a distinctive strategic coordination model that combined targeted industrial policy with export-oriented development, leveraging comparative advantages while systematically building indigenous industrial capabilities, especially in steel, shipbuilding, consumer electronics, semiconductors, and defense industrial manufacturing.¹⁷ Following the financial crisis of the late 1990s, Korea underwent significant economic restructuring that moved the country away from the heavy state intervention of earlier decades and toward adopting more market-oriented approaches and reducing direct government control over industry.¹⁸ Despite this shift, the government continues to play a strategic role in coordinating long-term industrial development and technological innovation, particularly in sectors with a strong foreign policy dimension.¹⁹

This legacy of coordination aligns well with the evolving demands of the space sector, where effective development increasingly depends on novel public-private collaboration models that balance commercial ambition with societal benefit.²⁰ Unlike postwar industrial development, where Korea built shipbuilding or semiconductor capabilities domestically before competing globally, the space economy forces latecomers to abandon sequential development models.

The space economy forces latecomers to abandon sequential development models... Korea's proven coordination networks position it well for complex technology domains requiring sustained government-industry collaboration.

While Korea's proven coordination networks position it well for complex technology domains requiring sustained government-industry collaboration, the space economy's unique characteristics reveal the boundaries of traditional industrial development approaches and necessitate strategic adaptation.

The space sector exemplifies three critical adaptation requirements that all space latecomers face that distinguish it from Korea's previous industrial successes. First, unlike defense procurement or domestic shipping demand, which both provided revenue foundations for capability building, Korea's limited domestic space market cannot subsidize the extended development periods that traditional coordination requires. Second, like Korea's shipbuilding²¹ and semiconductor manufacturing sectors²²—which were export oriented from the outset and developed capabilities in highly competitive global markets—space industrial development requires immediate international regulatory compliance and global competitive performance from the first launch. Third, commercial and technical success in the space economy requires mastery across multiple advanced technology domains simultaneously rather than the sequential capability expansion that characterized Korea's historical approach.²³

Korea's space industrial development also confronts technological dependencies that differ fundamentally from its previous industrial successes. The country currently relies on U.S.,²⁴ Japanese,²⁵ and European suppliers²⁶ for critical, high-precision components—radiation-hardened chips,²⁷ satellite payload instruments,²⁸ and advanced manufacturing equipment²⁹—creating vulnerabilities amid intensifying U.S.-China technological competition.³⁰ These import dependencies, combined with the three structural constraints outlined above, necessitate a fundamental adaptation of Korea's proven industrial coordination model. This adaptation framework (see table 3) shows how Korea's cluster approach maintains its coordination strengths while addressing the unique demands of space industrial development.

Table 3. South Korea's Industrial Policy Adaptation to the New Space Economy

Challenge	South Korea's Traditional Model	New Space Requirements	South Korea's Cluster Adaptation
Market Foundation	Domestic demand protected before exporting	Global competition from inception	Defense-space convergence provides a revenue foundation
Technology Development	Technological stepping stones available	Convergent mastery across domains	Regional hub specialization enables convergent capability development
Government Role	Direct industry coordination	Private sector leadership	Facilitated innovation networks maintain coordination advantages
Strategic Stakes	Industrial catch-up and export growth	Strategic autonomy through global networks	Technological sovereignty and alliance integration

The Cluster-Based Adaptation Strategy

Korea's response to space sector challenges builds directly on its long-term national space development planning, most recently articulated in the Fourth Basic Plan for Space Development Promotion (2022–2027), which shifts focus from state-led research and development (R&D) toward private sector–led industrial ecosystems.³¹ This approach leverages Korea's extensive experience with cluster-based industrial development, which has been a cornerstone of the country's economic growth strategy since the 1960s. Korea has long used cluster approaches to support industrial development and regional growth, evolving from government-directed production clusters in the 1960s–70s to more sophisticated R&D clusters by the 1980s–90s.³² Industrial clusters generate competitive advantages through geographic concentrations of interconnected companies and institutions, enhancing productivity through specialized supplier networks, knowledge spillovers, and innovation collaboration—dynamics that become particularly critical when traditional catch-up strategies are unavailable.³³ While many of Korea's clusters historically functioned as components of value-adding chains rather than fully integrated innovation ecosystems, the space cluster model represents an evolution toward more comprehensive innovation networks.

A central feature of Korea's current high-level space industrial development plan is a three-hub industrial cluster model (*samgakhyeong ujusaep keulleoseuteo chegye*) that colocates government research institutes, private companies, universities, and startups to accelerate innovation while retaining the coordination advantages of Korea's industrial policy tradition. The cluster approach represents a strategic adaptation to the structural constraints that distinguish space development from traditional industrial sectors (see table 3).

The cluster model addresses three critical requirements for new space industrial development. First, geographic concentration accelerates technology transfer between research institutions and industry, while fostering flexible supply chain networks that can quickly adapt to shifting market conditions. Second, clusters create an ecosystem where large corporations, specialized small- and medium-sized enterprises (SMEs), and startups can effectively collaborate on complex space systems that require a wide range of technological capabilities. Third, the cluster model enables more efficient government coordination by concentrating resources and expertise while supporting the rapid innovation cycles essential to competing in commercial space markets.

Through this framework, the national government in December 2022 designated Sacheon (Gyeongnam Province) for satellite manufacturing, Daejeon for research and talent development, and Goheung (Jeonnam Province) for launch vehicle operations as specialized zones within the national Space Industry Cooperation Zone framework. According to the fourth basic plan, these zones are designed to strengthen private sector–led capabilities, promote regional specialization, and coordinate the growth of a self-sustaining space ecosystem.³⁴ Each hub leverages distinct existing strengths while confronting unique coordination challenges that reflect the broader tensions between Korea's traditional industrial policy approaches and new space economy requirements (see table 4).

Table 4. South Korea's Space Cluster Specialization and Coordination Challenges

	Sacheon	Daejeon	Goheung
Purpose	Satellite hub	R&D hub and talent pipeline	Launch hub
Key Infrastructure	Satellite Development Innovation Center, Space Environment Testing Facility, Gyeongnam Aviation National Industrial Complex	Daedeok Innopolis, Space Technology Innovation, and Talent Development Center (planned)	Naro Space Center, Launch Vehicle Technology Commercialization Center
Lead Government Institution	Korea AeroSpace Administration	Korea Aerospace Research Institute, Defense Acquisition Program Administration, Agency for Defense Development	Korea Aerospace Research Institute
Industrial Base	Korean Aerospace Valley (KAV) has 61 aerospace firms, 53 leading space companies, and 125 industrial complexes	Over 1,000 public and private labs, tech firms, and government-funded institutes	Government-controlled launch operations, minimal commercial ecosystem
Cluster Advantage	Leverages existing aerospace manufacturing base (KAV with 61 firms, 73 percent of South Korea's airlines revenue)	Dense concentration of R&D infrastructure (over 1,000 labs/institutes in Daedeok Innopolis)	South Korea's only orbital launch facility with end-to-end space operations capability
Coordination Challenge	Scale-up from aviation to full satellite production	Bridge the research-to-market gap in compressed timelines	Enable private sector access despite limited launch frequency

As Korea formalized its space administration, the Korea AeroSpace Administration (KASA) advanced this cluster strategy through its Space Industry Cluster Tripartite System Construction Project, committing ₩380.8 billion (\$266.6 million, from 2024–2030) to establish the Launch Vehicle Technology Commercialization Center in Goheung, the Satellite Development Innovation Center in Sacheon, and the Space Technology Innovation and Talent Development Center in Daejeon.³⁵ Korea's cluster strategy is designed to leverage existing aerospace infrastructure while deliberately diversifying capabilities across multiple locations to reduce coordination vulnerabilities and accelerate private sector participation in the national space economy.

Sacheon: South Korea's Aerospace Manufacturing Hub

In May 2024, Yoon announced³⁶ his ambitions to develop the city of Sacheon into Northeast Asia's version of France's Toulouse,³⁷ a regional hub for space science and technology capable of attracting world-class talent. Sacheon has historically anchored the country's aviation capabilities and is now being repositioned as a key driver of Korea's new space economy.³⁸ Located in Gyeongnam Province, Sacheon is home to the newly established KASA and hosts flagship firms like Korea Aerospace Industries (KAI) and Hanwha Aerospace, Korea's two largest aerospace companies. KAI operates as a quasi-public enterprise with the Korea

Export-Import Bank holding a 26 percent stake as the largest shareholder, enabling sustained government coordination while maintaining private sector operational flexibility. The larger province drives 68.6 percent of Korea's total aerospace industry production (\$3.45 billion)³⁹ and hosts fifty-three leading space companies and 125 industrial complexes, like the National Aerospace Industrial Complex.⁴⁰

In September 2011, the Korean Aerospace Valley (KAV) emerged as a central industrial center in Gyeongnam and is now home to sixty-one SMEs and large aerospace firms.⁴¹ KAV accounts for 73 percent of Korea's airlines revenue, and over 10,000 employees work in the aviation parts industry in Gyeongnam.⁴² Thus, KAV serves as the manufacturing backbone of the national aerospace sector and creates a dense network of firms specializing in components and parts, supplying not only domestic giants like KAI and Korean Air but also international markets with the support of the Gyeongnam Export Support Corps for Aero-Parts within the KAV Aerospace Center.⁴³

To anchor Korea's ambitions in full-spectrum satellite manufacturing, Gyeongnam Province is establishing a comprehensive support ecosystem in the Jinju-Sacheon region as part of its designation as a satellite-specialized zone.⁴⁴ This ecosystem, centered around the new Gyeongnam Aviation National Industrial Complex, serves as the core base for developing a vertically integrated satellite industry, from component testing and fabrication to system integration and commercialization.⁴⁵ The Yoon government has committed ₩512.2 billion (\$358.5 million) through 2026 to build key infrastructure like the Space Environment Testing Facility and the Satellite Manufacturing Innovation Center to develop industry collaboration.⁴⁶ These investments are projected to generate ₩446.7 billion (\$332.5 million) in product inducement, ₩240 billion (\$171 million) in added value, and create over 2,300 jobs in Gyeongnam Province.⁴⁷

KAV's industrial base, paired with these recent investments, represents a strategic effort to streamline Korea's satellite production ecosystem by colocating R&D, prototyping, and commercialization infrastructure within a single cluster. By bringing together businesses, makers, and corporate zones under one roof, these centers are designed to facilitate more efficient collaboration and support the scale-up of private sector-led and domestic satellite capabilities.

Daejeon: Research and Talent Development Hub

Designated as Korea's research and development cluster within the national Space Industry Cooperation Zone framework, Daejeon's core strength lies in its long-standing role as the nation's innovation center. With a dense concentration of top-tier universities such as the Korea Advanced Institute of Science and Technology (KAIST), national research institutions like the Korea Astronomy and Space Science Institute (KASI), and major corporate R&D centers like those of Samsung and LG, Daejeon sits at the forefront of Korea's larger technological advancement.⁴⁸

The city is home to the Korea Aerospace Research Institute (KARI), the government's lead agency for space development, which has overseen major national programs like Naro-1⁴⁹ and Nuri,⁵⁰ the KOMPSAT satellite series,⁵¹ and Korea's first lunar orbiter, Danuri.⁵² Often working in parallel with KAIST, both serve as the backbone of Korea's public space R&D ecosystem, supported by an expansive network of institutions within the Daedeok Innopolis,⁵³ one of the world's most concentrated R&D zones, with over 1,000 public and private labs, tech firms, and government-funded institutes. Daejeon also houses the Defense Acquisition Program Administration and the Agency for Defense Development, linking national defense capabilities with the advancement of the space industry. Daejeon is pursuing the internationalization of its strategic industries through diplomacy, such as Daejeon mayor Lee Jang-woo's visit to Québec and Boston to establish partnerships in aerospace, quantum technology, biotech, and semiconductors and to position the city as a global hub for science and innovation.⁵⁴

This environment also makes Daejeon a natural launchpad for commercial space startups. Korean companies leading space innovation, including Perigee Aerospace (small launch vehicle development), Satrec Initiative (commercial Earth observation satellite manufacturing), and CONTEC (satellite ground station services and space data solutions), have all chosen to base their operations in Daejeon. These firms benefit not only from the city's access to advanced R&D infrastructure and talent but also from its proximity to national policymakers and procurement channels.⁵⁵ Daejeon's role in the cluster model comes from its ability to serve as the intellectual nucleus for Korea's space ambitions and to function as a training ground for the next generation of aerospace engineers.⁵⁶ Furthermore, Daejeon's selection as the host city of the 2025 International Space Summit reflects its ambition to evolve from a national science and technology hub into a global platform for the space industry beyond Korea.⁵⁷

Goheung: Launch Operations Hub

As the designated launch and mission operations zone, Goheung anchors Korea's sovereign space access infrastructure. Its central asset, the Naro Space Center (NSC), is Korea's first and only orbital launch facility and has served as the operational base for the KSLV-1 (Naro-1) and KSLV-II (Nuri) launch vehicle programs. Managed by KARI, the NSC includes not only launchpads, rocket assembly, and payload integration buildings but also a mission control center, tracking radar, and a satellite control facility, allowing everything from rocket testing and launch to satellite deployment and real-time monitoring.⁵⁸ This end-to-end functionality positions Goheung as an indispensable part of Korea's space value chain.

KARI continues to play a pivotal role in bridging public and private actors at Goheung by coordinating launches, ensuring safety compliance, and overseeing mission operations. Beyond hardware, Goheung's role is expanding through educational partnerships and space science outreach, including the NSC Exhibition Hall and space-themed programming with local schools.⁵⁹

However, despite the NSC's strategic role as Korea's only orbital launch site, the NSC faces significant constraints that limit its potential to anchor a robust commercial launch ecosystem. Since its establishment in 2009, only seven test launches have occurred, and all were conducted by KARI.⁶⁰ Requests from private firms to use the NSC have been largely denied due to scheduling conflicts with Nuri preparations, despite the presence of two launch pads. In response to this problem, industry actors are looking to establish their own launch capabilities.⁶¹ To address this issue, KASA's Space Industry Cluster Tripartite System Construction Project seeks to establish the Launch Vehicle Technology Commercialization Center, which would further collaboration among industry and government actors, and KARI is considering opening the NSC to further private use.⁶²

Korea's cluster-based approach marks a significant departure from the geographic concentration that drove its previous industrial successes. The shipbuilding clusters of Ulsan and semiconductor concentration in the Seoul Metropolitan Area succeeded precisely because they colocated all critical functions within dense, interconnected ecosystems. The space cluster model, by contrast, distributes capabilities across three regions—a choice justified by existing aerospace and bureaucratic infrastructure. This geographic dispersion creates a structural tension at the heart of Korea's space strategy: While the distributed model addresses space economy requirements for simultaneous capability development, it sacrifices the intensive coordination and knowledge spillovers that made Korea's traditional clusters effective. The result is a strategy that acknowledges new space realities while potentially undermining the coordination advantages that enabled Korea's proven industrial policy successes.

Implementing the Cluster Model: Commercial Competition and Strategic Partnerships

Korea's three-hub cluster model offers a strategic framework for adapting industrial policy to the space economy. It leverages existing aerospace infrastructure, new regulatory frameworks, and a growing startup ecosystem, while explicitly linking commercial development with national security and international partnerships. Early momentum is already visible: New regulatory frameworks have been introduced to support commercial space activity, and private investment in space startups continues to grow alongside a strong aerospace industrial base. The establishment of KASA in 2024 consolidates previously fragmented space functions, enabling systematic industrial ecosystem development and streamlining commercial space regulations. These steps, together with expanding private investment and a skilled talent pipeline, create early momentum for Korea's space industrial development.

While Korean media has praised the strategy for its ambition and vision, expert assessments have emphasized the need to address governance complexity, regional friction, and the speed of budget approvals. An independent government feasibility review of the 2023 Space Industry Cluster Tripartite System Construction Project flagged risks tied to approving funding before finalizing site decisions and to an incomplete governance framework, underscoring implementation uncertainties even as the project secured national R&D funding. These debates highlight that the cluster's theoretical advantages face practical hurdles as implementation begins.⁶³ Even so, the project's national R&D funding and high-level political backing demonstrate strong government commitment to overcoming these challenges.

This section examines three dimensions that will determine how effectively Korea can translate its strategic vision into practical outcomes: (1) institutional coordination and political challenges across agencies and regions, (2) integration of private commercial actors into global markets while building domestic capabilities, and (3) leveraging defense-space convergence to strengthen U.S.-ROK alliance cooperation.

Institutional Adaptation and Political Challenges

KASA's establishment in 2024 consolidated major space functions previously distributed across KARI, Ministry of Science and Information and Communication Technology (MSIT) research programs, and various defense-related space initiatives. The consolidation timeline spans 2024–2026, enabling systematic industrial ecosystem development rather than isolated technological achievements. KASA's governance structure reflects ongoing institutional adaptation challenges, with the agency placed under MSIT rather than having direct presidential oversight. This creates coordination complexity with overlapping authority across Korea's Ministry of Trade, Industry, and Energy for industrial policy, Ministry of National Defense for military space programs, and provincial governments for cluster implementation.⁶⁴

Government coordination within clusters focuses on facilitating international partnerships from the outset, implementing streamlined regulatory frameworks announced in KASA's 2024 commercial space guidelines, and leveraging domestic demand from Korea's expanding defense satellite programs to provide revenue foundations for commercial development. However, Korea's constrained domestic satellite deployment—with only twelve satellites launched between 2013 and 2022 compared to over 4,000 launched by the United States—limits the revenue foundations available to cluster companies.⁶⁵

Korea's space cluster development reveals fundamental tensions between traditional coordination approaches and space sector requirements. Geographic dispersion has reportedly created practical coordination challenges, with the 2.5-hour distance between the major hubs (see figure 1) complicating the intensive government-industry coordination that characterizes Korea's successful industrial clusters.⁶⁶ Korean policy experts note that this spatial constraint limits the country's ability to fully capitalize on the advantages that make regional cluster

approaches effective for industrial policy. This is because localized clusters generate competitive advantages through shared infrastructure, specialized supply chains, knowledge transfer between firms, and collaborative research and development.⁶⁷ Korea's distributed cluster model therefore confronts early-stage limitations as the hubs attempt to develop the intensive coordination and innovation partnerships that define effective industrial policy.

Namely, a growing flash point is the conflict between Daejeon and Sacheon over the centralization of aerospace governance and research functions.⁶⁸ Representative Seo Cheon-ho of the People Power Party, who represents Sacheon, Namhae, and Hadong, has been a leading proponent of consolidating space institutions in Sacheon, proposing the Special Act on the Establishment and Operation of the National Space Administration.⁶⁹ This would require relocating KARI and KASI to Sacheon to align them with the newly established KASA. However, this proposal sparked immediate backlash from political and scientific communities in Daejeon, where KARI and KASI are currently headquartered.⁷⁰ The Democratic Party's (DPP) Daejeon City local party denounced the move as "regional selfishness," and the KARI labor union echoed this sentiment, citing reasons why Sacheon does not meet global administrative standards, calling instead for the relocation of KASA to the country's administrative capital Sejong.⁷¹

Similarly, the Basic Space Bill, introduced by DPP lawmaker Jeong Dong-young in June 2025 and under committee review, would establish a new space development agency with expanded authority beyond the Space Development Promotion Act's narrower focus on technology development to encompass space industry cultivation and commercial space activities.⁷² Proponents argue that an overarching agency would ensure systematic coordination of space development, safety, and public welfare objectives, but critics warn that such moves would render existing agencies ineffective and reduce KASA to a symbolic entity, hindering Korea's ambition to become a top-five space power.⁷³ This is part of an ongoing struggle to establish a unified and strategically coherent institutional framework, as just last year debates were shelved around DPP lawmaker Hwang Jeong-ah's proposal to establish KASA's headquarters in Daejeon, as opposed to Sacheon.⁷⁴ While local leaders like Sacheon Mayor Park Dong-sik argue that building an "aerospace complex city" around KASA in Sacheon is a national imperative rather than a regional bid, competing legislative agendas and conflicting institutional visions reveal a fundamental lack of consensus on how to adapt Korea's space institutions to meet the demands of the new space economy.⁷⁵

Commercial Integration and Global Market Requirements

Korea's current space industrial development confronts the compressed timelines and simultaneous global competition that distinguish the contemporary space economy from previous industrial domains. The government's targeted support for startups and broadened private sector participation beyond traditional R&D agreements reflects a deliberate shift to foster globally competitive commercial space firms from the outset. Korean space companies must compete immediately in fast-moving global markets while building domestic

capabilities—creating unprecedented coordination challenges for traditional industrial policy approaches. This challenge reflects broader patterns of the new space economy, where entrepreneurs acquire equity funding to develop independent space application projects and face immediate global competition requirements.⁷⁶

Korea's approach mirrors global patterns in the nearly exponential proliferation of new space companies over the past two decades, particularly in small satellite launch and ground station technologies where startups have demonstrated cost-effective innovations.⁷⁷ Startup integration operates through multiple pathways that create bridges between Korea's venture capital ecosystem and space industry requirements.⁷⁸ The inherently global nature of the space market creates immediate, international competitive pressures for Korean startups. As InterGravity founder and CEO Keejoo Lee observed, space represents an inherently "global business" where companies "have to think about the limitations of a small market," necessitating immediate overseas expansion rather than domestic market development.⁷⁹ This constraint is particularly acute in Korea's context: CONTEC founder and CEO Sunghye Lee estimated that the domestic space market represents only 1 percent of Korea's space industry, forcing companies to pursue international partnerships from inception.⁸⁰ This mirrors global patterns where space startups typically "serve customers worldwide since the beginning," with new ventures targeting international markets from their founding.⁸¹

Korea's startup support efforts focus on diversifying participation methods for private space companies beyond traditional R&D agreements, expanding satellite imaging market access to the private sector, and providing enhanced support for launch vehicle enterprises facing difficulties in building track records. In 2021—prior to the Yoon administration's launch of a comprehensive space program—the Moon Jae-in administration facilitated technology transfer from research institutions like KAIST to major aerospace companies including Hanwha Aerospace, Korea Aerospace Industries, and LIG Nex1, while establishing new space research centers to pursue advanced technologies like intersatellite link systems.⁸² Government-backed technology transfer programs facilitate startup access to research developed at KARI and university partners, while partnership structures enable startups to access *chaebol* supply chains through cluster-based networking events.⁸³

These efforts occur within a human capital environment that shows promising growth, with Korea's total space industry workforce reaching 8,042 employees in 2023.⁸⁴ Nearly three-quarters of the workforce is concentrated in private firms, with the remainder distributed across research institutes and universities.⁸⁵ Early startup participation includes companies developing satellite components, ground station services, and space data analytics—areas where small companies can compete globally without requiring massive capital investments in launch systems or satellite constellations.⁸⁶ These focus areas align with successful business models in the global space economy, particularly those that leverage space-enabled technologies for specialized markets without requiring full satellite constellation ownership.⁸⁷ As of 2023, Korea's space sector includes fifty-one startup companies, with an average of seven new companies entering the market annually.⁸⁸

In this booming domain, local capital access does not appear to constrain Korea's space sector growth. Private investment flows have remained robust, with venture capital actively financing emerging space companies while established conglomerates pursue strategic acquisitions both domestically and internationally. Between 2018 and 2021, domestic startups such as CONTEC, Nara Space, and Perigee Aerospace raised approximately ₩84.4 billion (approximately \$60 million) from private venture capital. Simultaneously, major Korean corporations have executed significant strategic investments: Hanwha Systems invested ₩428.5 billion (\$300 million) in Eutelsat OneWeb, Hancom acquired InSpace, and Hanwha Aerospace acquired Satrec Initiative.⁸⁹ These investment patterns suggest sustained private sector engagement across Korea's space ecosystem, indicating that financial resources support rather than limit sectoral development.

Defense Convergence and U.S.-ROK Alliance Considerations

North Korea's recent breakthrough in satellite deployment—achieving its first successful military reconnaissance satellite launch in November 2023 after multiple failures earlier that year—signals Pyongyang's determination to establish space-based surveillance capabilities over the Korean Peninsula and regional U.S. military installations.⁹⁰ This threat environment ensures sustained government support for technologies serving both civilian space development and national security requirements.

Space systems development shares fundamental technological foundations with missile defense, satellite communications, and intelligence gathering capabilities—creating convergence between civil, commercial, and military applications.⁹¹ The security imperative created by North Korea's advancing space and missile capabilities provides strategic rationale for this convergence. This overlap gives South Korea a unique opportunity to leverage its mature defense-industrial base as a springboard into high-value space segments, while strengthening alliance interoperability and access to trusted partners' technology ecosystems.

Today's technological overlap mirrors the Cold War–era competition between the Soviet Union and the United States, where space achievements served simultaneously as demonstrations of scientific prowess, commercial potential, and military capability. Today's space competition similarly blends these domains, with private companies like SpaceX advancing both commercial satellite deployment and national security launch capabilities,⁹² while China's space program explicitly integrates military and civilian objectives under a unified state direction.⁹³

Korea's space industrial cluster strategy explicitly leverages this convergence through its well-developed defense industrial base, with sustained government R&D investment creating the technological foundation for this transformation.⁹⁴ Government R&D expenditure helped Korea's budding industry leapfrog its peers over the past forty years, with government support for aircraft R&D expanding dramatically from ₩184 billion (\$279 million) in 1980 to ₩24.2 trillion (\$22.3 billion) in 2020.⁹⁵ More recently, government

Rather than limiting itself to absorbing U.S. transfers, South Korea has built industrial clusters that partner with U.S. firms to codevelop new capabilities, creating mutual dependencies that deepen alliance ties.

R&D spending targeting space, aviation, and maritime technology grew at roughly 7 percent annually from 2012 to 2020, increasing from about ₩1.6 trillion (\$1.1 billion) to ₩2.9 trillion (\$2.1 billion).⁹⁶ This investment pattern established substantial technological capabilities that transfer effectively across defense and aerospace applications.

Established aerospace firms—such as Korea Aerospace Industries (founded in 1999),⁹⁷ Hanwha Aerospace (originally established as Samsung Precision in 1977 and acquired by Hanwha Corporation in 2014),⁹⁸ and LIG Nex1 (founded in 1976 as Goldstar Precision and incorporated into the LIG Group in 2004)⁹⁹—demonstrate how Korea’s long-standing defense industrial base provides a strong foundation for advancing into space systems development. KAI’s experience producing the KF-21 fighter aircraft—which reached approximately 65 percent domestic component production through government-backed technology initiatives¹⁰⁰—provides technological foundations directly applicable to satellite systems and launch vehicles, including advanced composite manufacturing, avionics integration, and precision assembly processes. Government support has facilitated specific technological synergies between aerospace and defense and space systems, with Korean firms building expertise in guidance systems, advanced materials, and electronics through defense programs that directly apply to space development.

Korea’s cluster-based strategy leverages these defense-space synergies across its three regional hubs. The Sacheon aerospace manufacturing hub builds on KAI’s fighter aircraft production expertise and established supply chains, while companies like Hanwha Aerospace transition from conventional defense contracting into space systems through technology transfer and joint programs backed by government R&D investment. Korean Air and Hanwha Aerospace have expanded joint ventures with Boeing and U.S. defense primes to codevelop aerospace semiconductors, digital manufacturing systems, and urban air mobility technologies—all of which serve both defense and space markets, reinforcing Korea’s strategy of using defense-industrial infrastructure as a springboard for entry into high-value commercial space segments.

Korea has prioritized domestic launch capability as a strategic investment in technological independence and dual-use readiness. The successful Nuri space launch vehicle testing in October 2021, following an eleven-year development timeline, demonstrates how sustained government investment builds indigenous capabilities that reduce foreign technology dependence while serving civilian and military needs.¹⁰¹ Government financial support, including R&D subsidies and low-interest development funding, has proven essential for companies engaged in both aircraft manufacturing and space development given the exceptionally high costs involved.¹⁰²

Space technology’s dual-use nature has become central to alliance planning as both South Korea and the United States adapt to an increasingly contested space domain. Rather than

limiting itself to absorbing U.S. transfers, South Korea has built industrial clusters that partner with U.S. firms to codevelop new capabilities, creating mutual dependencies that deepen alliance ties. These initiatives include work on satellite-based reconnaissance and missile warning systems designed to integrate with U.S. architectures—such as next-generation infrared early warning networks—and ensure compatibility between Korean and U.S. navigation systems. Such collaboration increases the redundancy and responsiveness of allied intelligence and early warning functions across the Indo-Pacific.¹⁰³

This convergence and government-led initiative enables Korea to leverage its defense export industry, valued at ₩13.83 trillion (\$9.5 billion) in 2024¹⁰⁴ and ranked eighth-largest globally.¹⁰⁵ This foundation supports the development of space capabilities while strengthening alliance resilience. Korea's increasingly autonomous capabilities reduce vulnerability to foreign-reliant system disruptions while contributing ISR assets of its own, thus enhancing alliance resilience rather than dependency.¹⁰⁶ As the United States pursues a strategy of tech-enabled coalition building, space cooperation with Korea reinforces shared threat assessments and expands trusted industrial partnerships in critical dual-use domains, though specific technology-sharing agreements remain subject to evolving export control frameworks.¹⁰⁷

At present, Korea's tripartite cluster model suggests how an ambitious industrial strategy can open new opportunities for private-sector growth, technology partnerships, and international integration, even as its early rollout highlights the governance and coordination challenges inherent in adapting legacy industrial policy to the fast-moving space economy.

Conclusion

Korea's nascent space industrial clusters represent an early test of how late entrants can adapt proven coordination mechanisms for strategic domains that eliminate traditional protected learning environments. While the approach leverages Korea's institutional strengths—sustained government-industry coordination and an established industrial base—the early implementation process suggests tensions that call into question whether traditional national coordination advantages can be maintained in globally networked industries demanding immediate competitiveness.

At one level, Korea's experience illuminates a fundamental challenge facing all countries seeking late entry into strategic technology domains: how to develop capabilities when space operations require immediate global integration and regulatory compliance, eliminate technological stepping stones that enabled sequential learning, and exhibit positional network effects (such as orbital slots, frequencies, and operational networks) that favor early entrants. Korea's distributed cluster model attempts to address these constraints by leveraging existing aerospace infrastructure while enabling simultaneous capability development across multiple

domains, yet the geographic separation and administrative coordination challenges between hubs create practical coordination difficulties that may undermine the intensive government-industry collaboration that made Korea's traditional clusters effective.

On a second level, the industrial governance battles documented in this analysis—particularly the ongoing conflict between Daejeon and Sacheon over aerospace administration centralization—reveal deeper tensions about how to adapt coordination mechanisms for new domain requirements. These conflicts suggest that Korea's distributed approach may be creating coordination problems without fully leveraging—or, even worse, undermining—the advantages it was designed to achieve. Combined with limited commercial utilization of the NSC launch assets and the struggle to balance systematic capability building with rapid market responsiveness, early evidence indicates notable implementation challenges. The next eighteen-to-twenty-four months will provide critical indicators: resolution of institutional governance frameworks, demonstration of meaningful technology transfer across distributed hubs, and Korean firms' ability to capture global market share in satellite manufacturing and related technologies.

Korea's space industrial development builds on institutional foundations that suggest potential continuity across presidential transitions, though the extent of this stability remains an open question given the sector's reliance on sustained coordination and long-term investment horizons. More importantly, Korea's space strategy leverages globally integrated industries—aerospace manufacturing, defense exports, and advanced technology sectors—that have demonstrated resilience across political transitions due to their deep integration into international supply chains and export markets. The political dimensions of Korea's aerospace industry governance, exemplified by KAI president Kang Gu-young's resignation on Lee Jae Myung's first day in office following established patterns of leadership turnover with each new government,¹⁰⁸ reveal ongoing tensions between political appointment cycles

and long-term aerospace development requirements. The Lee administration's positioning of the space industry as central to its “creativity-driven, technology-led growth” strategy¹⁰⁹ suggests institutional commitment that transcends electoral cycles, yet the sustainability of Korea's coordination-based approach will ultimately depend on whether globally integrated economic foundations prove stronger than political transition pressures.

The success or failure of Korea's coordination-based adaptation will provide crucial evidence about whether late entrants can maintain their institutional advantages while competing in globally networked industries.

For policymakers in other latecomer spacefaring nations, Korea's experience offers both cautionary lessons and strategic opportunities. Progress in scientific cooperation, exemplified by the September 2024 NASA-KASA cooperation agreements, demonstrates additional pathways for late entrants to integrate into global space networks through research collaboration and joint mission development.¹¹⁰ Moreover, the defense-space convergence strategy demonstrates how late entrants can leverage existing industrial capabilities to access new strategic domains

through dual-use technologies, creating potential pathways for alliance integration that enhance mutual capabilities rather than duplicate existing strengths. Recent U.S. export control reforms that streamlined space technology sharing with Australia, Canada, and the UK—while not extended to Korea—suggest evolving allied cooperation frameworks that could enable deeper technological partnerships for countries pursuing alliance-based space strategies.¹¹¹ However, renewed space competition and the militarization of space¹¹² inherently limit how much any individual nation can achieve through independent development, reinforcing the strategic logic of alliance-based approaches.

Korea's approach also suggests broader patterns relevant to other strategic technology domains where similar structural transformations are occurring—such as artificial intelligence, quantum computing, and advanced manufacturing—all of which increasingly exhibit immediate global competition, compressed innovation cycles, securitized supply chains and tech transfer mechanisms, and the elimination of protected learning environments. The success or failure of Korea's coordination-based adaptation will provide crucial evidence about whether late entrants can maintain their institutional advantages while competing in globally networked industries, or whether participation in these domains requires abandoning traditional coordination approaches entirely.

The stakes extend beyond Korea's space capabilities to fundamental questions about industrial policy adaptation in contemporary technological competition. The tripartite cluster model represents an attempt to maintain coordination advantages while participating meaningfully in industries that increasingly determine strategic positioning. Whether this approach proves viable will indicate how countries with established coordination capabilities might navigate the tension between institutional strengths and global integration requirements that characterize twenty-first-century strategic domains.

About the Authors

Darcie Draudt-Véjares, PhD is a fellow for Korean studies in the Asia Program at the Carnegie Endowment for International Peace. A political scientist and policy analyst, she publishes regular commentary on South and North Korean domestic politics and foreign policy, Northeast Asian relations, and U.S.-Korea policy.

Kaylin Kim is a research assistant in the Asia Program at the Carnegie Endowment for International Peace.

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