REPUBLIC OF KOREA CHAIR

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FROM SATELLITES TO SECURITY

India-South Korea Cooperation in Space and Defense Technologies

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ABOUT THIS REPORT

This report examines the strategic potential of India-South Korea cooperation in space and defense sectors, addressing the persistent implementation gap that has limited their Special Strategic Partnership despite five decades of diplomatic relations. While bilateral trade has grown significantly to USD 25.56 billion by 2021-22, the partnership has struggled to translate shared interests into concrete outcomes in high-technology sectors.

The report demonstrates how deepening collaboration in space and defense can transform this relationship from a declaratory framework into a results-oriented partnership. It analyzes the complementary strengths of both nations: India's cost-effective space launch capabilities, satellite applications expertise, and growing defense manufacturing base, alongside South Korea's advanced precision manufacturing, cutting-edge electronics, and proven defense export success.

Contemporary geopolitical challenges, including China's assertive space capabilities and North Korea's accelerating missile programs, create urgency for enhanced technological cooperation between these democratic allies. The establishment of Korea Aerospace Administration (KASA) in 2024 and India's ongoing space sector reforms provide new institutional frameworks for unprecedented collaboration.

The report provides comprehensive assessments of both nations' capabilities, examines common threat perceptions, identifies specific collaboration opportunities, and offers detailed policy recommendations designed to bridge the implementation deficit and enhance mutual security in an increasingly contested strategic environment.

ABOUT THE REPUBLIC OF KOREA CHAIR AT CSDR

The Republic of Korea Chair at CSDR aims to enhance the understanding and cooperation between India and the Republic of Korea through research and policy engagement. Launched in Jan 2025, with a grant from the Korea Foundation, the Chair intends to create broader awareness and in-depth understanding of the India-ROK relationship, which remains limited despite growing governmental engagement.

ABOUT COUNCIL FOR STRATEGIC AND DEFENSE RESEARCH

Founded in January 2020 by Lt. Gen. D.S. Hooda (Retd.) and Dr. Happymon Jacob, CSDR is an innovative think tank and consultancy specializing in foreign policy, geopolitical risk, connectivity, and critical areas of defense and aerospace. With a focus on the Indian subcontinent, Eurasia, and the Indo-Pacific, CSDR is committed to generating strategic insights that drive meaningful change. Read more at www.csdronline.com

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Executive Summary

- This report demonstrates how strategic cooperation in space and defense technologies can transform the India-South Korea partnership from a declaratory framework into a results-oriented partnership, identifying specific pathways for collaboration that can enhance mutual security while strengthening both nations' positions in an increasingly contested strategic environment.
- Despite five decades of diplomatic relations and Special Strategic Partnership status since 2015, India-South Korea ties suffer from persistent implementation deficits that prevent realizing transformative potential, with cooperation remaining largely declaratory rather than results-oriented despite bilateral trade doubling to USD 25.56 billion following the Comprehensive Economic Partnership Agreement.
- China's assertive space capabilities (450 satellites vs. India's 54) and expanding Indo-Pacific military footprint, combined with North Korea's accelerating missile programs, have fundamentally altered regional security calculations, creating compelling incentives for deeper technological cooperation between democratic allies facing common threats from the China-North Korea-Pakistan nexus.
- India offers cost-effective space launch services, proven satellite applications expertise, and growing defense manufacturing through "Atmanirbhar Bharat," while South Korea contributes advanced precision manufacturing, cutting-edge electronics, and proven defense export success as the world's 10th largest arms exporter, creating natural synergies for substantive collaboration.
- India's remarkable space achievements—launching 433 foreign satellites and the historic Chandrayaan-3 lunar mission—align with South Korea's ambitious goals, including a Moon landing by 2032 and a Mars mission by 2045, supported by new institutional frameworks like the Korea Aerospace Administration established in 2024 and India's ongoing space sector reforms enabling private participation.
- The K9 Vajra-T howitzer project demonstrates successful cooperation, achieving over 50% indigenization and proving combat-effective during India-China border tensions, leading to additional orders worth USD 253 million and setting a precedent for technology transfer partnerships that enhance India's defense manufacturing capabilities while providing South Korea market access.
- Both nations face asymmetric space vulnerabilities, with India lagging in non-kinetic counterspace technologies against China's anti-satellite capabilities demonstrated since 2007, while South Korea confronts North Korea's advanced missile technology and military reconnaissance satellites like Malligyong-1, necessitating collaborative space situational awareness and defense strategies.
- Korean companies prioritize commercial interests and intellectual property protection, while Indian stakeholders often lack targeted technological engagement, resulting in cancelled projects like naval minesweeper deals and withdrawal from submarine acquisition initiatives despite government-level interest, highlighting structural divergences in government-private sector relations.
- The emerging Russia-China-North Korea alignment, evidenced by North Korean troop deployments supporting Russia in exchange for ballistic missile technology and China's 81% share of Pakistani weapons imports, creates overlapping strategic concerns that provide a compelling rationale for deeper India-South Korea space and defense cooperation.
- Short-term trust-building initiatives, mid-term collaboration on downstream space technologies and defense sub-systems, and long-term joint development of satellite navigation systems and maritime security frameworks can transform this partnership from transactional engagement into substantive strategic cooperation that enhances mutual security and contributes to regional stability in an increasingly contested strategic environment.

Introduction

The India-South Korea strategic partnership stands at a critical juncture. Despite five decades of diplomatic relations since 1973 and the formal elevation to a Special Strategic Partnership (SSP) in 2015, the bilateral relationship has yet to fulfil its transformative potential.[1] While economic ties have expanded significantly, with bilateral trade growing from USD 12 billion in 2009-10 to USD 25.56 billion in 2021-22[2] following the implementation of the Comprehensive Economic Partnership Agreement (CEPA), the bilateral ties suffer from a persistent implementation deficit that undermines their strategic aspirations.

This implementation gap is most evident in high-technology sectors where both nations possess complementary strengths yet struggle to translate shared interests into concrete outcomes. The pending upgradation of CEPA, since 2016,[3] exemplifies broader institutional inertia that has constrained cooperation in emerging technologies, defense industrial collaboration, and advanced manufacturing. Despite numerous MOUs and institutional dialogues, tangible results remain limited, particularly in sectors critical to 21st-century strategic competition.

The contemporary geopolitical landscape presents both urgency and opportunity for recalibrating this partnership. China's assertive space capabilities and expanding military footprint in the Indo-Pacific, coupled with North Korea's accelerating missile and nuclear programs, have fundamentally altered the regional security calculus. These developments necessitate deeper technological cooperation between democratic allies who share common security challenges and complementary capabilities.

Space and defense technology represent the most promising domains for actualizing the strategic potential of India-South Korea relations. India's cost-effective space launch capabilities, demonstrated satellite applications expertise, and growing defense manufacturing base complement South Korea's advanced precision manufacturing, cutting-edge electronics, and proven defense export success. The convergence of their technological strengths, combined with shared vulnerabilities to regional threats, creates a natural foundation for substantive collaboration that transcends traditional trade-focused engagements.

The establishment of the Korea Aerospace Administration (KASA) in 2024 and India's ongoing reforms in the space sector provide institutional frameworks that can enable unprecedented cooperation. Similarly, South Korea's rise as the world's 10th largest arms exporter and India's efforts toward defense indigenization through initiatives like "Atmanirbhar Bharat" create complementary incentives for deeper industrial collaboration.

This report demonstrates how strategic cooperation in space and defense technologies can transform the India-South Korea partnership from a declaratory framework into a results-oriented alliance. It highlights specific pathways for collaboration that can enhance mutual security while strengthening both nations' positions in an increasingly contested strategic environment.

As the SSP approaches its second decade in 2025, the opportunity for meaningful partnership remains, but it is gradually diminishing. The rapid pace of technological advancement, increasing strategic competition, and evolving threat environments require both nations to move beyond mere institutional incrementalism toward genuine collaboration that leverages their combined strengths to address shared challenges.

Synergies in Space and Defense

Among other sectors, space and defense have gradually emerged as priority sectors between India and South Korea, consistently highlighted in joint statements, bilateral dialogues, and strategic roadmaps. For example, the India-Republic of Korea Joint Statement in 2019[4] called for expanding cooperation in the defense industry, while reaffirming mutual interest in peaceful uses of outer space.

Growing institutional recognition, coupled with shared regional security concerns and complementary technological strengths, has led to deepening engagement in these domains. Joint ventures such as the K9 Vajra-T howitzer project between India's Larsen & Toubro (L&T) and South Korea's Hanwha Aerospace, and the partnership between the Indian Space Research Organisation (ISRO) and the Korea Aerospace Research Institute (KARI) on satellite technology and remote sensing, portray strategic alignment. This cooperation enables both to fulfill their shared national goals, such as defense indigenization, diversification of supply chains, and enhancing regional security through space-based surveillance.

> "Growing institutional recognition, coupled with shared regional security concerns and complementary technological strengths, has led to deepening engagement in these domains. Joint ventures such as the K9 Vajra-T howitzer project between India's Larsen & Toubro (L&T) and South Korea's Hanwha Aerospace portray strategic alignment.

Furthermore, India leads in space technology, while South Korea has an edge in defense manufacturing. For instance, ISRO has achieved milestones through missions like Mangalyaan and Chandrayaan, as well as by launching hundreds of foreign satellites. Meanwhile, South Korea ranks among the world's top ten arms exporters, with its K9 howitzers and FA-50 fighter jets. This presents a complementary relationship, offering a natural synergy for joint development and forming the foundation for a mutually beneficial strategic partnership.

The space and defense sectors are keystones of innovation and have direct bearing on national security, and strategic autonomy, which India and South Korea prioritize amid rising geopolitical tensions, technological competition, and demographic shifts. Space-based technologies are crucial for modern military operations, supporting missile warning systems, surveillance, precision strikes, and command & control. For instance, satellites enable real-time intelligence gathering and the detection of missile launches. On the other hand, military demands lead to advancements in the space sector, fostering innovation and accelerating the development of satellite and launch technologies. Cooperation in these fields will help India reduce external dependencies and enable South Korea to expand its global footprint.

SPACE CAPABILITIES	India	South Korea
Space Agency	1969 (ISRO)	1989 (KARI), 2024 (KASA)
Government Expenditure (2024)	USD 1.89 billion	USD 1.03 billion
Launch of First Satellite	Aryabhata (1975)	KITSAT-1 (1992)
Number of Satellites Launched	400+ (including foreign satellites)	~40+ (including experimental and Earth observational satellites)
Total Operational Satellites	51 (as of 2023)	13 (as of 2023)
Satellite Navigation System	Navigation with Indian Constellation- NavIC (IRNSS)	No indigenous system yet Korea Augmentation Satellite System (KASS); Korean Position System (Under Development)
Lunar Missions	Chandrayaan 1 (2008), Chandrayaan-2, (2019), Chandrayaan-3 (2023), Chandrayaan – 4 (planned in 2027)	Danuri (Korea Pathfinder Lunar Orbiter, 2022); Lunar Lander planned post-2030
Mars Missions	Mangalyaan – 2013	Plans to land in 2045
Space Station Plans	Bharatiya Antriksh Station - by 2035	None
Human Spaceflight Program	Gaganyaan- scheduled for 2027	Not yet
Private Sector Participation	420+ startups (IN-SPACe)	Nascent; KASA now enabling
Global Launch Services	Yes (433 foreign satellites launched since 1999)	Not Available
International Collaborations	NASA, Roscosmos, JAXA, CNES, ESA etc.	NASA, CSA, DLR, ASTU, ESA, JAXA, etc.
Notable Launch Vehicles	PSLV, GSLV, SSLV, LVM-3	KSLV-I (Naro-1), KSLV-II (Nuri)
First Space Launch Vehicle	SLV-3 (First launch in 1980)	*Naro-1* or KSLV-1 (First launch in 2009)
Military Space Capabilities	ASAT tested (Mission Shakti, 2019); GSAT-7 series, EMISAT (reconnaissance satellite)	Project 425- Reconnaissance Satellite KOMPSAT Program
Recent Major Missions	Chadrayaan-3; Aditya-L1 (solar observatory); SpaDeX Docking - 2025	Danuri; Korea's 4th spy satellite – 2025
Space Economy Size	USD 8.4 Billion (2024)	USD 7.5 Billion (2024)

Sources: (ISRO, KARI, Statista)

South Korea’s Space Program

Although a latecomer to the space industry, South Korea has made remarkable progress in its space-related activities. In 2022, it became the seventh country in the world to launch the space rocket Nuri (KSLV-II) using domestically developed technology, fulfilling its ambition of becoming a space power.[5]

South Korea's first homegrown space rocket "Nuri" on the launch pad at the Naro Space Centre in Goheung in South Jeolla Province, a day before its expected launch. (Korea Aerospace Research Institute via AFP)

A brief history of South Korea’s Space Program

South Korea’s space program began thirty to forty years after its liberation from Japanese colonial rule in 1945. Following the Korean War (1950-53), South Korea faced economic hardship and a shortage of resources to support scientific exploration. With a Gross National Product (GNP) of USD 67 per capita in 1953,[6] South Korea faced difficulties in establishing the foundations for a scientific and technological base to develop satellites. For instance, South Korea was also unable to participate in global space initiatives, such as the International Geophysical Year (1957-58), due to a lack of funding. On the other hand, North Korea built its first astronomical observatory equipped with a German-made telescope in March 1957.[7]

Nevertheless, inspired by the launch of Sputnik I in October 1957, South Korea began developing its space capabilities. Early efforts included amateur rocketry[8] by individuals like Kim Kiyong (launched a self-built rocket measuring 107 cm in height and weighing 65 kg in March 1958) and Cho Joongsuk (launched a four-stage rocket measuring 37.5 cm in height and weighing 2.25 kg weight in August 1958), along with the establishment of the National Defense Scientific Research Institute (NDSRI) in 1956. However, political turmoil in the 1960s, including the overthrow of President Rhee Syngman and a military-led coup d’état by Park Chung-hee, led to the shutdown of NDSRI and a halt in scientific progress in the space domain.

In the 1970s, increasing threats from North Korea and the US’s Nixon Doctrine[9] steered the establishment of defense agencies like the Agency of Defense Development (ADD),[10] which later contributed to advancements in space technology. By the 1980s, the government recognized the importance of space

technology for economic growth, leading to the formation of the Korea Aerospace Research Institute (KARI) in 1989 and the launch of the first Korean satellite, the KITSAT-1 in 1992.[11]

The 1990s marked a turning point, as South Korea's space ambitions grew with KARI and the development of domestic rockets. While South Korea relied on international collaboration, such as with the UK for the KITSAT-1,[12] it also achieved milestones, including the successful launch[13] of its first space vehicle, Naro-1, in 2013.[14] In recent years, South Korea's space program has advanced with the 2022 launch of the Korea Pathfinder Lunar Orbiter Danuri, which was carried by SpaceX's Falcon 9 rocket.[15]

A Korean Space Launch Vehicle 1 rocket, also called Naro, launches into orbit from South Korea's Naro Space Center on Wednesday, successfully carrying a science satellite into orbit. Source: Korea Aerospace Research Institute.

Current Situation

On May 27, 2024, South Korea established a new agency, Korea AeroSpace Administration (KASA), to oversee commercial launches and satellite capabilities and to accommodate South Korea's Fourth Space Development Promotion Basic Plan of 2023.[16] The plan aims to make South Korea one of the five major space powers by doubling the space budget, developing 130 satellites, developing an independent projectile for Moon and Mars landing, addressing military space technology, and upgrading capabilities for weather observation, maritime communications, flood monitoring, etc.[17]

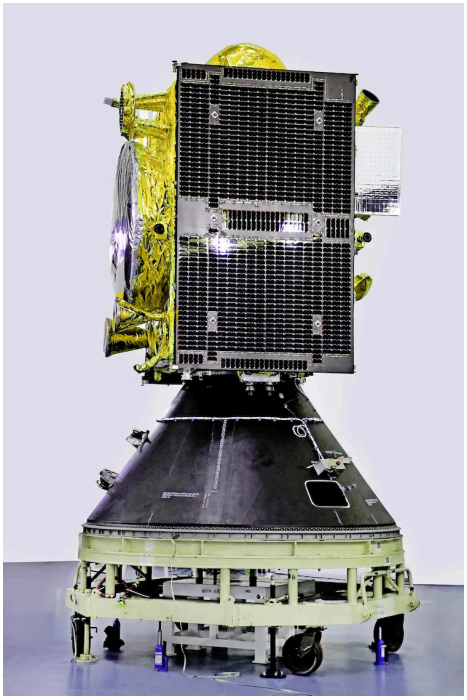
KASA unites "scattered Korean space programs under one organisation and fosters private space industry development."[18] KASA took over KARI's role in space exploration and in developing new technologies. The government spending toward space programs is projected to double to USD 1.1 billion from 2022 to 2027.[19] With KASA, Seoul aims to enhance its military space capabilities, thereby strengthening the satellite surveillance system to monitor North Korea and developing early-warning capabilities for ballistic missile threats.[20] KASA has also set ambitious goals, including landing a domestically developed spacecraft on the

Moon by 2032, on Mars by 2045, and fulfilling (now impeached) President Yoon's dream of strengthening South Korea's space program.[21]

KASA's establishment is crucial as it can help South Korea develop an indigenous space program, enhancing space exploration and strengthening its space economy.[22] This transition from scattered initiatives to a unified national strategy indicates a maturing space agenda that builds on historical achievements and prepares for future challenges.

India's Space Program

India has demonstrated remarkable growth and success in its space program. In 2023, India captured global attention by becoming the first country to land near the lunar south pole region. With this achievement, India joined the elite club of nations that have achieved a soft landing on the moon, alongside the US, the former Soviet Union, and China.[23] In 2025, ISRO reached a milestone by launching its 100th satellite, NVS-02, that forms a part of India's Navigation with Indian Constellation (NavIC) aboard the Geosynchronous Satellite Launch Vehicle (GSLV).



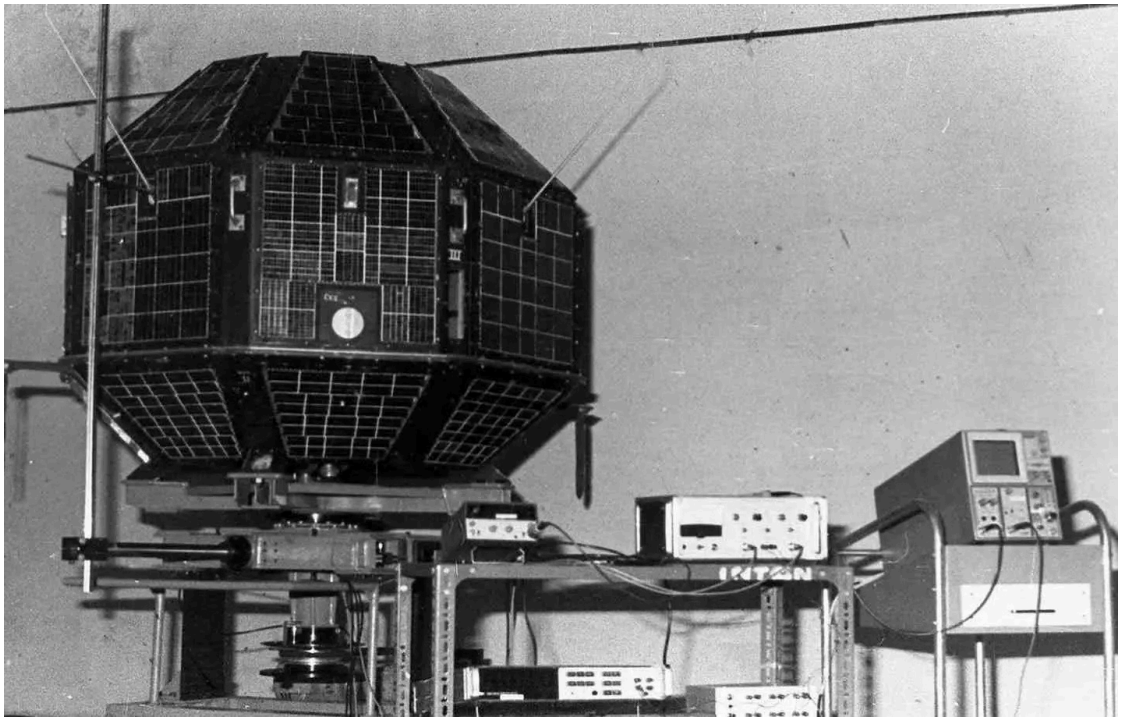
NVS-02 satellite will boost the Indian navigation constellation. (Photo: Isro)

A brief history of India's Space Program

India's space program has been primarily driven by the objective of leveraging space-based technologies to address socio-economic challenges.24 While space security, influenced by China-Pakistan missile collaborations,[25] has been a driving factor, the primary focus has remained on civilian applications, such as communications, meteorology, and remote sensing.[26]

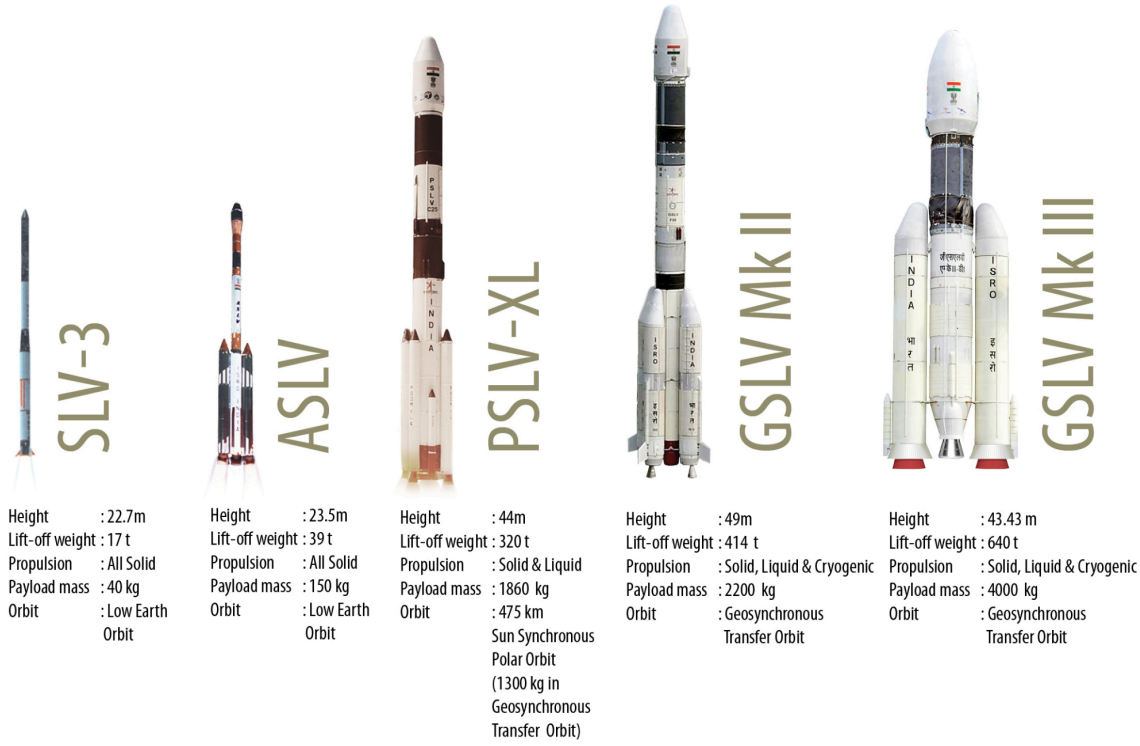
The foundation of India's space program was laid by Prime Minister Jawaharlal Nehru and scientists like Dr. Homi J. Bhabha and Dr. Vikram Sarabhai, who emphasized science and technology as essential means for

nation-building and modernization. Moreover, India, much like South Korea, actively approached space programs following the launch of Sputnik in 1957. India participated in the International Geophysical Year (IGY)[27] and also established the Indian Space Research Organization (ISRO) in 1969.[28] On April 19, 1975, India launched its first satellite—Aryabhata—with Soviet assistance,[29] marking the beginning of India's space journey. Over time, ISRO developed critical systems like the Indian National Satellite System[30] (INSAT) and the Indian Remote Sensing (IRS), strengthening India's capabilities in telecommunications, meteorology, television broadcasting, and disaster warning systems.



Aryabhata satellite. File photo: ISRO

A key success of India's space program is the development of launch vehicles, enabling the country to offer launch services to other nations. From 2014 to 2024, India has launched a total of 393 foreign satellites from 34 countries including the "US (232), UK (83), Singapore (19), Canada (8), South Korea (5), Luxemburg (4), Italy (4), Germany (3), Belgium (3), Finland (3), France (3), Switzerland (2), Netherland (3), Japan (2), Israel (2), Spain (2), Australia (1), UAE (1), Austria (1), etc."[31] ISRO's Polar Satellite Launch Vehicle (PSLV) is usually chosen by other nations due to its success rates and cost-effectiveness. For example, in May 1999, India's PSLV-G (2) rocket launched the Korean satellite KITSAT-3.[32] In 2024, ISRO's PSLV-XL launched the European Space Agency's (ESA) Proba-3 mission from the Satish Dhawan Space Centre in Sriharikota. It was chosen due to its success rate of over 97%, level of precision, and cost-efficiency.[33]



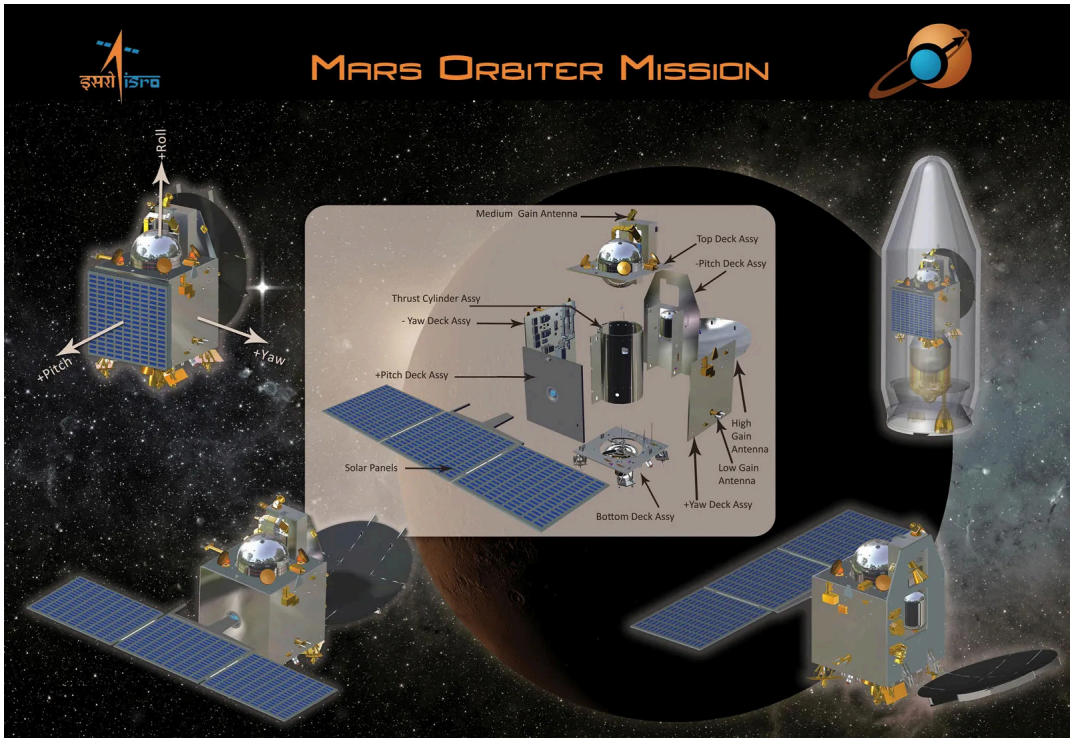
ISRO's launch vehicles. Source Insights IAS

Towards Space Exploration

The foundational efforts have enabled India to transition from basic applications to ambitious exploration, positioning it as a key player in the global space economy. The Indian Space economy is expected to grow to USD 44 billion by 2033 (from USD 8.4 billion in 2022).[34]

While India continues to develop advanced space-based applications for civilian use, it has also increasingly focused on space exploration. In India's space journey, the private sector has recently emerged as a key stakeholder, addressing challenges such as capacity constraints and high costs, while making access to space more affordable and offering timely, cost-effective solutions. For instance, the Indian National Space Promotion and Authorization Centre (IN-SPACe) and NewSpace India Limited (NSIL) facilitate participation of the private sector.[35] ISRO has also privatized the manufacturing of its launch vehicles, such as the PSLV. Privatization has enabled ISRO to dedicate more time to space exploration and other critical missions, particularly in light of the growing demands from India's security sector.

Landmark missions like the Mars Orbiter Mission (MOM) or Mangalyaan[36] and upcoming ventures like the Venus Orbiter Mission (VOM) or Shukrayaan,[37] Chandrayaan-4, and Gaganyaan (India's first human spaceflight),[38] reflect India's rising capabilities. Under the broader framework of Space Vision 2047, India also aims to establish a national space station—Bhartiya Antariskh Station (BAS) by 2035. With the space economy valued at USD 8.4 billion in 2024,[39] private sector engagements are poised to accelerate India's space ambitions significantly.



Artist's rendering of the Mars Orbiter Mission. Source: Britannica

Emerging Areas for Bilateral Cooperation in Space

India and South Korea bring complementary strengths to the table. India offers cost-effective, advanced launch vehicle service and expertise in satellite applications, while South Korea brings advanced R&D in dual-use and defense-oriented technologies. The emergence of KASA and India's space sector reforms, enabling private sector participation, provides a timely opportunity to deepen collaboration.

In 2015, ISRO and KARI signed an agreement[40] to collaborate on peaceful space exploration, committing to joint efforts in lunar exploration,[41] satellite navigation, and space science. Additionally, there are four areas—satellite navigation, space exploration, space transportation services, and training of experts, where South Korea can cooperate with India to enhance its space capabilities.[42]

Militarization of Space: Threats from China and North Korea

The contemporary geopolitical landscape, marked by increasing militarization of space and regional tensions in East and South Asia, makes space security and cooperation more vital than ever. As China expands its space capabilities and North Korea continues to advance its missile capabilities, regional players like India and South Korea have all the incentives needed to deepen technological partnerships in this sector.

China

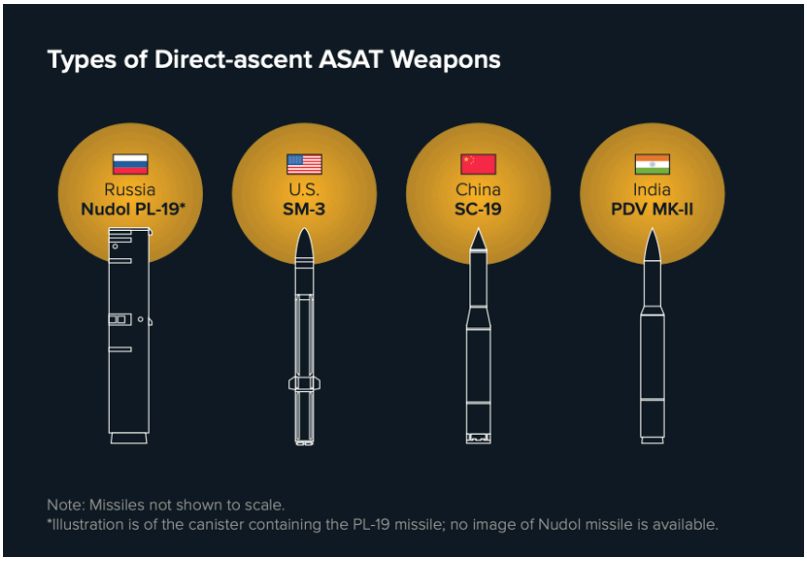
China's rapid advancements in space, including lunar missions and growing military space capabilities, have positioned it as a leading space power. Its assistance to Pakistan in developing a space program, along with kinetic and non-kinetic space weaponry, directly threatens India's national security.[43]

India's space program has focused primarily on peaceful and civilian applications. India also signed the Outer Space Treaty in 1967, which prohibits placing weapons of mass destruction in space and restricts the militarization of outer space.[44] However, the growing threat from China is compelling India to adopt a military posture in outer space.[45] India is strengthening its space-based defense architecture with the deployment of defense satellites.[46]

China has developed both kinetic and non-kinetic anti-satellite (ASAT) capabilities.[47] In 2007, China destroyed a satellite in orbit, and by 2014, the US Department of Defense projected that China could target satellites in geostationary orbit.[48] China has also developed technologies for jamming and disrupting satellite operations.[49] For example, it deployed "four anti-satellite jammers near the Arunachal Pradesh border in October 2020, during the India-China border standoff in Ladakh."[50] China is also capable of targeting satellite ground stations with cyberattacks, similar to Russia's attack on Ukraine's Viasat network.

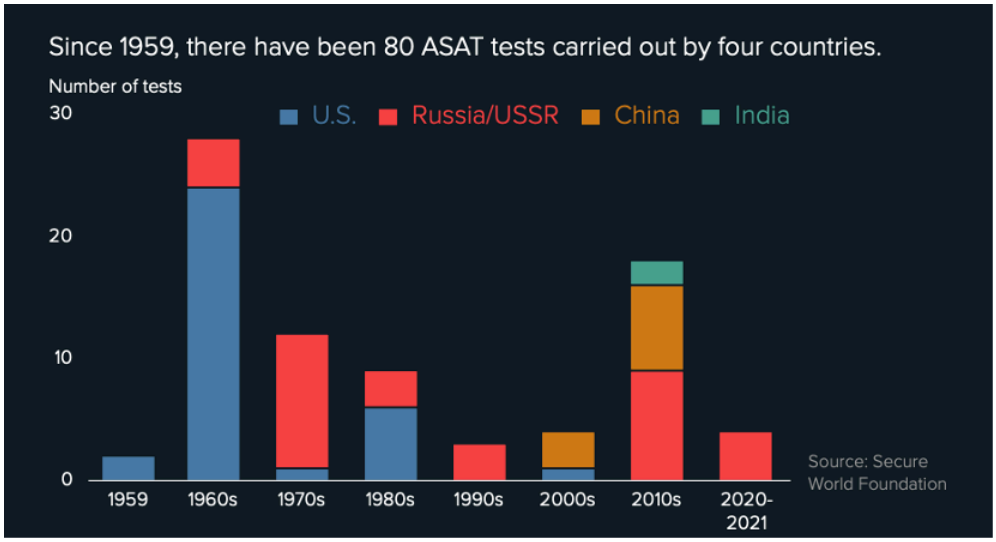
India perceived China's ASAT test of 2007 as a threat to "its space-based economic and national security infrastructure."[51] In response, India successfully tested an ASAT weapon in 2019 (Mission Shakti) using a three-stage Ballistic Missile Defense (BMD) Interceptor PDV MK-II[52] Missile and targeted a live satellite in low Earth orbit. With this, India demonstrated its capability to interdict and intercept a satellite in outer space.[53] India is preparing to launch "52 satellites over the next ten years for surveillance and reconnaissance", under its Space-Based Surveillance (SBS) programme.[54]

"China has developed technologies for jamming and disrupting satellite operations. For example, it deployed "four anti-satellite jammers near the Arunachal Pradesh border in October 2020, during the India-China border standoff in Ladakh."



Source: Secure World Foundation

India's BMD Interceptor PDV MK-II



Source: Secure World Foundation

There exists a significant asymmetry between India and China in terms of space capabilities, with India lagging in non-kinetic and counterspace technologies. This provides China a strategic edge, enabling it to target Indian satellites and space-monitoring stations in Vietnam, Indonesia, and Mauritius.[55] As of 2024, data by the Department of Space shows that India operates 54 satellites compared to China's nearly 450,[56] highlighting the vast disparity in orbital assets. While ISRO carried out 15 missions in 2024, only five launch missions were dedicated to deploying Indian satellites.[57]

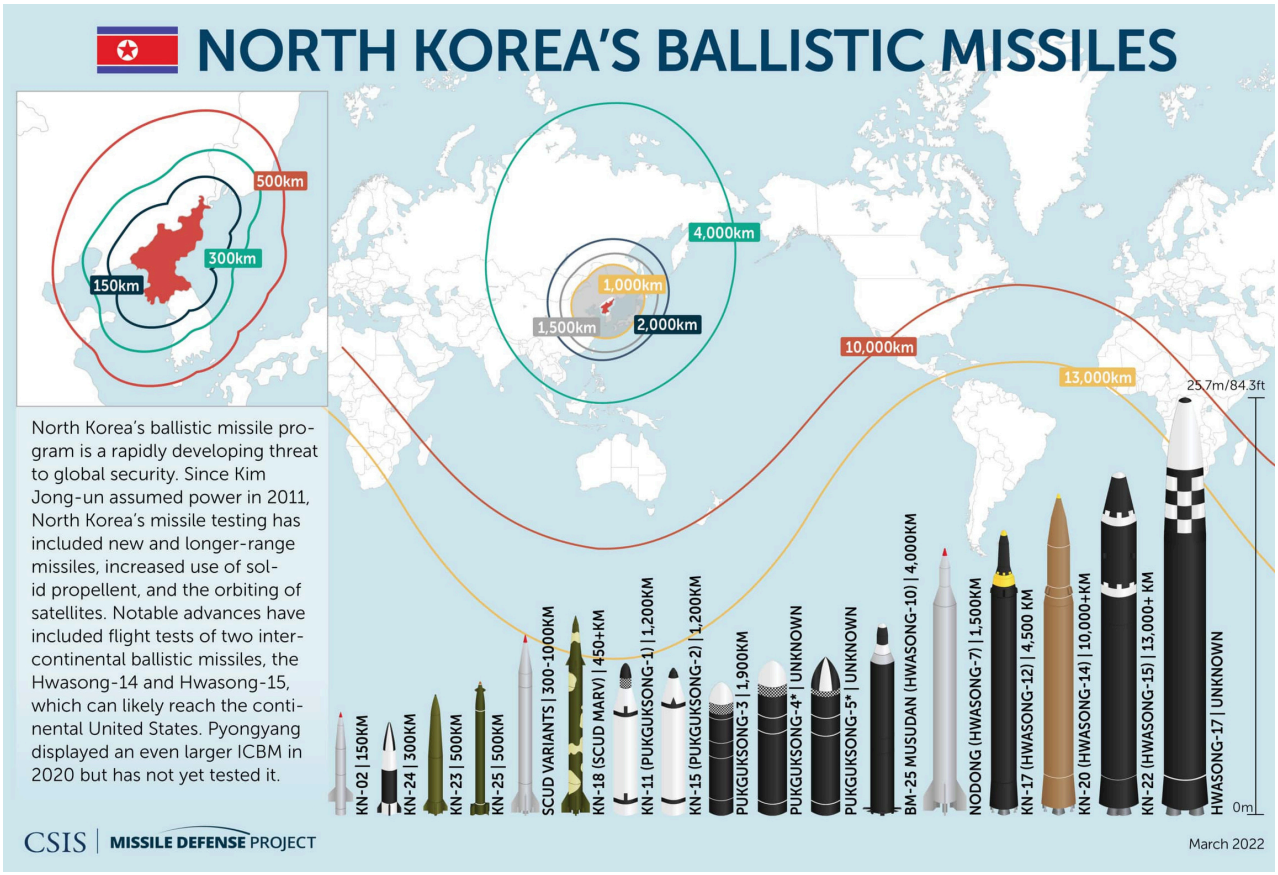
Due to the imbalance in space capabilities between the two countries, there is no mutual vulnerability, as India remains significantly more exposed to Chinese space threats.[58]

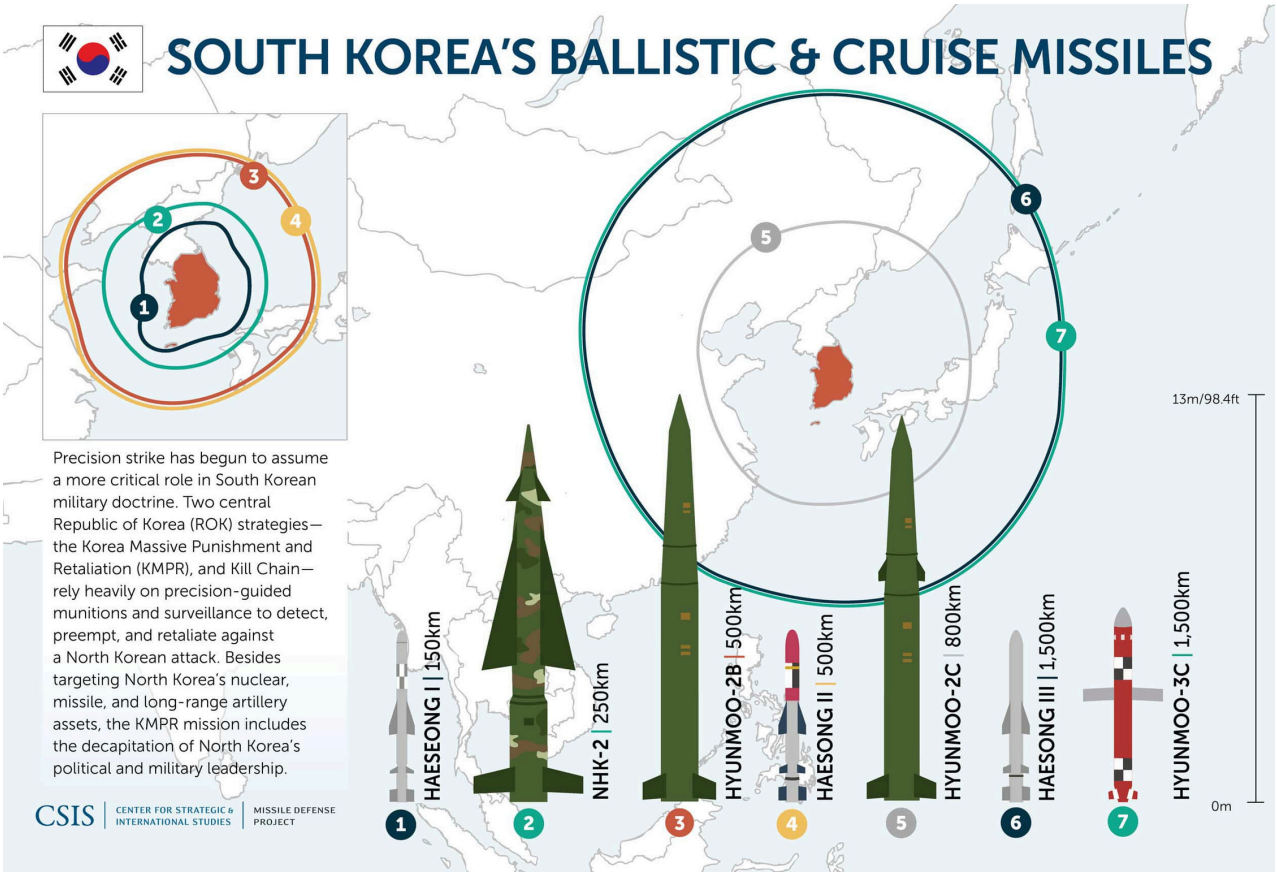
North Korea

Asymmetry in space technologies is also evident between South Korea and North Korea. South Korea's space program lagged significantly behind that of its neighbors, such as China and Japan.[59] On the other hand, North Korea demonstrated more advanced rocket capabilities than South Korea in the early 2000s. Currently, North Korea's missile technology supports its nuclear ambitions,[60] and experts fear that with its ballistic missile and nuclear capabilities, it could theoretically launch and detonate a nuclear weapon in space.[61]

While North Korea had developed rocket engines, South Korea is still behind in that area (but ahead in satellite technology).[62] After North Korea began actively developing ballistic missiles and launched Taepondong-1(multi-stage ballistic missile) in 1998, South Korea accelerated its space program.[63]

Fearing that South Korea might respond to North Korea's missile advances by developing its long-range capabilities, the US imposed strict technology-transfer restraints. These curbs, driven by concerns that Seoul could "convert [space] technology to military purposes", significantly stifled South Korea's space ambitions for decades.[64] As a result, South Korea was unable to launch vehicles with a range of more than 180 kilometers or capable of carrying payloads exceeding 500 kilograms.[65] While these limitations were sufficient to deter the North Korea threat, they prevented South Korea from achieving an independent space launch capability.


NORTH KOREA'S BALLISTIC MISSILES
500km
300km
150km
4,000km
1,000km
1,500km
2,000km
10,000km
13,000km
25.7m/84.3ft
0m
KN-02 | 150KM
KN-24 | 300KM
KN-23 | 500KM
KN-25 | 500KM
SCUD VARIANTS | 300-1000KM
KN-18 (SCUD MARV) | 450+KM
KN-11 (PUKGUKSONG-1) | 1,200KM
KN-15 (PUKGUKSONG-2) | 1,200KM
PUKGUKSONG-3 | 1,900KM
PUKGUKSONG-4* | UNKNOWN
PUKGUKSONG-5* | UNKNOWN
BM-25 MUSUDAN (HWASONG-10) | 4,000KM
NODONG (HWASONG-7) | 1,500KM
KN-17 (HWASONG-12) | 4,500 KM
KN-20 (HWASONG-14) | 10,000+KM
KN-22 (HWASONG-15) | 13,000+ KM
HWASONG-17 | UNKNOWN
North Korea's ballistic missile program is a rapidly developing threat to global security. Since Kim Jong-un assumed power in 2011, North Korea's missile testing has included new and longer-range missiles, increased use of solid propellent, and the orbiting of satellites. Notable advances have included flight tests of two intercontinental ballistic missiles, the Hwasong-14 and Hwasong-15, which can likely reach the continental United States. Pyongyang displayed an even larger ICBM in 2020 but has not yet tested it.
CSIS | MISSILE DEFENSE PROJECT
March 2022


SOUTH KOREA'S BALLISTIC & CRUISE MISSILES
1
2
3
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5
6
7
13m/98.4ft
0m
HAESEONG I | 150km
NHK-2 | 250km
HYUNMOO-2B | 500km
HAESONG II | 500km
HYUNMOO-2C | 800km
HAESONG III | 1,500km
HYUNMOO-3C | 1,500km
Precision strike has begun to assume a more critical role in South Korean military doctrine. Two central Republic of Korea (ROK) strategies—the Korea Massive Punishment and Retaliation (KMPR), and Kill Chain—rely heavily on precision-guided munitions and surveillance to detect, preempt, and retaliate against a North Korean attack. Besides targeting North Korea's nuclear, missile, and long-range artillery assets, the KMPR mission includes the decapitation of North Korea's political and military leadership.
CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES | MISSILE DEFENSE PROJECT

Blocked by US restrictions and eyeing North Korean advances, Seoul turned to Moscow for jointly developing the Naro-1 launch vehicle and building the Naro Space Center.[66] Russia also trained and sent a South Korean astronaut, Yi So-yeon, to the International Space Station (ISS) in 2008.[67] However, amid the Russia-Ukraine War, South Korea has cut space ties with Russia.[68]

North Korea's space and missile program poses a threat to South Korea and the US. It has outpaced South Korea in militarizing space and cyberspace, achieving milestones such as the launch of its first military reconnaissance satellite Malligyong-1 in 2023 and advancing its ballistic and hypersonic missile programs,[69] reportedly with assistance from China, Iran, and Pakistan.[70] North Korea lags behind in building a space industrial base, but it has accelerated the development of military applications, including GPS jamming and deploying cyber forces for major attacks such as the USD 1.5 billion crypto heist.[71] North Korean hackers also targeted India's Kudankulam Nuclear Power Plant (KNPP) and ISRO through a cyber-attack in 2019.[72]

This photo provided by the government of the Democratic People's Republic of Korea shows the launch of the Malligyong-1 satellite into orbit on Nov 21, 2023. (KOREA NEWS SERVICE VIA AP)

The space capabilities gap between India and China, as well as between South Korea and North Korea, poses serious security challenges. Given their shared security concerns, both countries should deepen cooperation in space and defense to address such growing threats.

DEFENSE CAPABILITIES	India	South Korea
Miliary Spending (2024)	$86.1 Billion	$47.6 Billion
Spending as a share of GDP (%)	2.3	2.6
Active Military Personnel	1.4 million	~500,000
Global Rank in Arms Export (2024)	~25th (Economic Survey)	10th (SIPRI)
Global Rank in Arms Import (20-2024)	2nd	12th
Weapons imported from	Russia, France, Israel, US	US and UK
Main destinations of defense products exports	US, France, and Armenia	Poland, US, Indonesia, Turkey, Thailand, UAE, Finland, Norway
Nuclear Arsenal	170-180 warheads	None
Air Force Strength	Rafale, Su-30MKI, Tejas Mk1A, Mirage 2000, MiG-21, MiG-29	F-35A, F-15K, KF-21 (in production), KAI KF-16
Air Defense Systems	S-400 'Sudarshan', Akash, Barak-8, SPYDER	KAMD: L-SAM, KM-SAM (Cheongung-II), Patriot PAC-3
Ballistic & Cruise Missile Arsenal	Agni series (Agni I-V), Prahar, Dhanush, Prithvi (I-II), Sagarika/Shaurya; BrahMos, Nirbhay	Nike Hercules Korea Series (NHK1-2), Hyunmoo Series, (Hyunmoo 2A, 2B, 2C. 3, 3B, 3C, 3D/4); Haesong (I-III)
Naval strength	130+ ships	~160 ships
Submarine Fleet	INS Arighaat (SSBN), Arihant-class (nuclear powered), Scorpene-class (diesel electric)	9 submarines; KSS-III (SLBM-capable) in development
Aircraft Carrier	INS Vikramaditya, INS Vikrant	CVX program (in development)
Indigenous Fighter Programs	Tejas Mk1a (in service), Tejas Mk2 (in development), AMCA (5th-gen stealth, in development)	KF-21 Boramae (4.5 gen, production started in 2024)
Strategic Focus	Two-front threat (Pakistan and China); emphasis on self-reliance and indigenous production	North Korea Deterrence; emphasis on precision strike capabilities and missile defense
Companies/ Organisations involved	Hindustan Aeronautics Limited (HAL), Defense Research and Development Organisation (DRDO), Bharat Dynamics Limited (BDL), Ordnance Factories Board (OFB), etc.	Hanwha, Korea Aerospace Industries (KAI), Hyundai Rotem, LIG Nex1, Agency for Defense Development (ADD), Defense Acquisition Program Administration (DAPA), etc.

Sources: (OEC, Business Standard, SIPRI, Economic Survey, CSIS,CSIS India, SIPRI Fact Sheet)

India's Defense Sector

India's defense sector has been shaped by a continuous tension between indigenization and dependence on foreign suppliers. Post-independence, India inherited British-era military assets used to protect and support British rule in India.[73] In 1958, the government established the Defence Research and Development Organisation (DRDO) with a vision to produce cutting-edge defense technologies.[74]

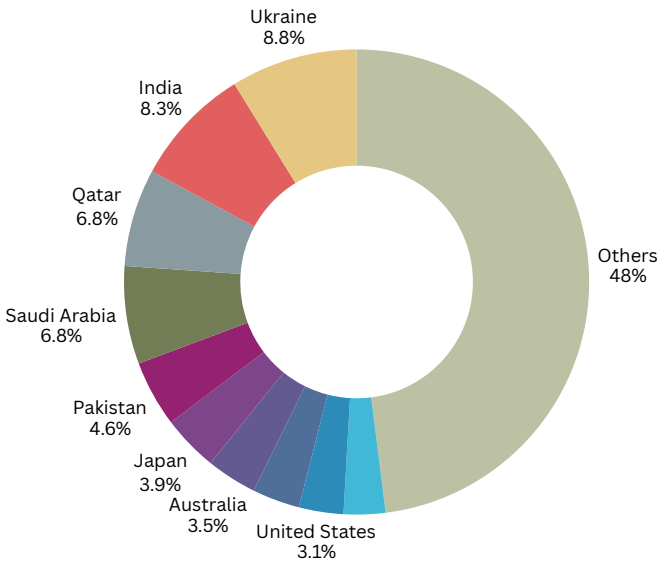
However, in 1962, India faced a major setback when the Sino-Indian war revealed the country's lack of military preparedness.[75] As a response, India increased its defense spending significantly from 1.5% to 2.3% of GDP.[76] Also, the US arms embargo on India during the Indo-Pak war in 1965 pushed India to deepen its strategic and defense ties with the Soviet Union (SU). Consequently, SU became India's primary defense supplier, providing a wide range of advanced military equipment and facilitating licensed production within India. For example, the manufacturing of the MiG-21 fighter jet by Hindustan Aeronautics Limited (HAL) exemplified SU's transfer of technology and rights for local assembly to India.[77]

In the 1980s, India began investing in homegrown capabilities. As a result, DRDO received greater funding and launched landmark missile programs including Prithvi, Akash, and Nag.[78] In 1998, the SU and India also signed a contract to jointly develop the BrahMos supersonic cruise missile system[79] post-economic liberalization in the 1990s, and through the 2000s, India gradually shifted to private sector involvement from a purely state-run model. Policy reforms set up the stage for a more diversified and competitive defense manufacturing ecosystem. Government initiatives, such as Make in India/Atmanirbhar Bharat, have continued to encourage domestic innovation and reduce dependency on imports in the defense sector.[80]

Transformation in India's Defense Sector

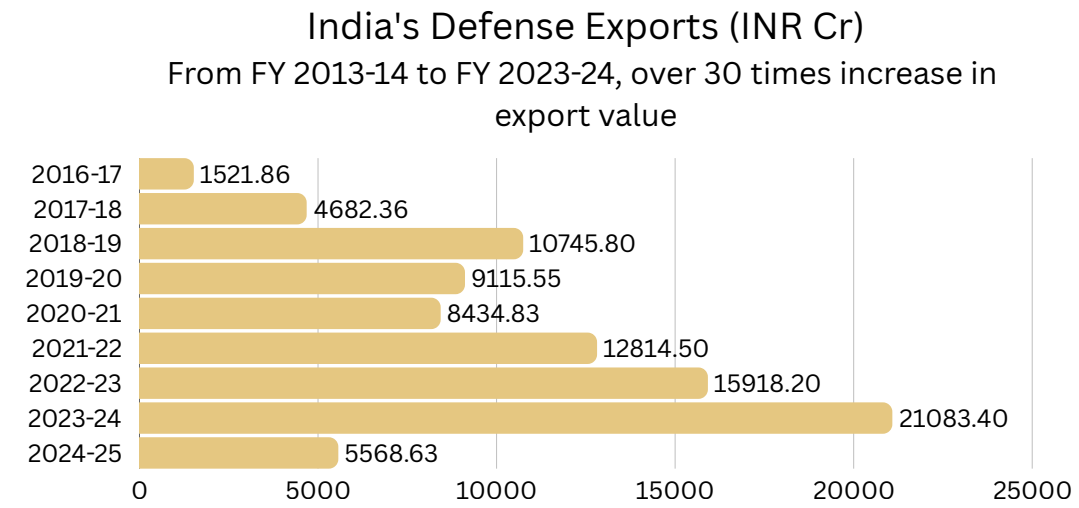
In 2023, India became the fourth-largest military spender (USD 84 billion) after the US, China, and Russia.[80] India is also gradually emerging as an exporter of arms, ammunition, and fuses. In 2024, the US, France, and Armenia became the top buyers of Indian defense exports, with Armenia notably leading in the purchase of fully finished weapon systems, including 155mm artillery guns, the Akash air defense missile, and the Pinaka multi-launch rocket systems.[81] Despite India's push for indigenous defense production, it remains the world's second-largest arms importer, following Ukraine. According to the Stockholm International Peace Research Institute (SIPRI) report, India accounted for 8.3% of global imports.[82] This marks a decline from 9.3% in the 2015 to 2019 period, reflecting India's gradual progress in designing and manufacturing weapons at home.

Global share of imports of major arms by the 10 largest importers, 2020-24



Source: SIPRI

This coincides with India's journey towards military modernization. India institutionalized greater inter-service cooperation by creating three tri-service agencies focused on cyber warfare, space, and special operations. In 2020, the government appointed India's first Chief of Defense Staff (CDS) for greater integration across the Army, Navy, and Air Force and to lead the push for theatre commander—joint commands that cut across service lines. The Indian Parliament also passed the Inter-Services Organisations (Command, Control, and Discipline) Act in 2023 to govern the integrated system.[84]



Source: fortuneindia.com

Still a long way to go

Building on this legacy of strategic shifts, India's defense sector today is marked by both modernization and persistent challenges.

In 2025, India's defense budget saw an increase of 9.52%. However, a significant portion of this increase is driven by growing pension liabilities and revenue expenses rather than capital investments in boosting military capabilities. Therefore, the budget continues to stand at just 1.9% of the projected GDP for 2024-25—a level many analysts believe falls short of what is needed to address India's evolving security challenges.[86]

Despite the government's ambitious target of achieving defense production worth USD 26 billion by 2025, actual growth in manufacturing output remains sluggish. On the export front, India is still far from meeting the goals, albeit with a noticeable rise in international sales. A key bottleneck lies in the performance of Defense Public Sector Undertakings (DPSUs) that have been slow to adapt to global market expectations. For instance, HAL lost an international tender in Malaysia for Tejas aircraft, which was passed over in favor of South Korea's FA-50.[87]

While India has become one of the few countries in acquiring and producing cutting-edge defense technologies like aircraft carriers (INS Vikrant), intercontinental ballistic missiles (Agni-V), and nuclear-powered submarines (INS Arihant), it still relies on "cooperating…and receiving support from the most advanced technological nations for its defense capabilities."[88] India has collaborated with Russia for BrahMos supersonic cruise missiles and with Israel for the Barak-8 missile system, acquired the C-17 Globemaster[89]

and Apache helicopter from the US, and purchased Rafale fighter jets from France.

India still relies heavily on licensed production of major defense systems. This is because India lacks the technological depth required to design and produce complex platforms, critical components, and advanced materials domestically, many of which are still imported. The license manufacturing accounts for nearly 58% of India's defense procurement, representing its extent of external dependency.[90] Also, although large private firms like Tata Advanced Systems and L&T have made significant contributions, systemic hurdles (limited access to contracts and complex regulatory frameworks) continue to restrict their full participation.[91]

South Korea's Defense Sector

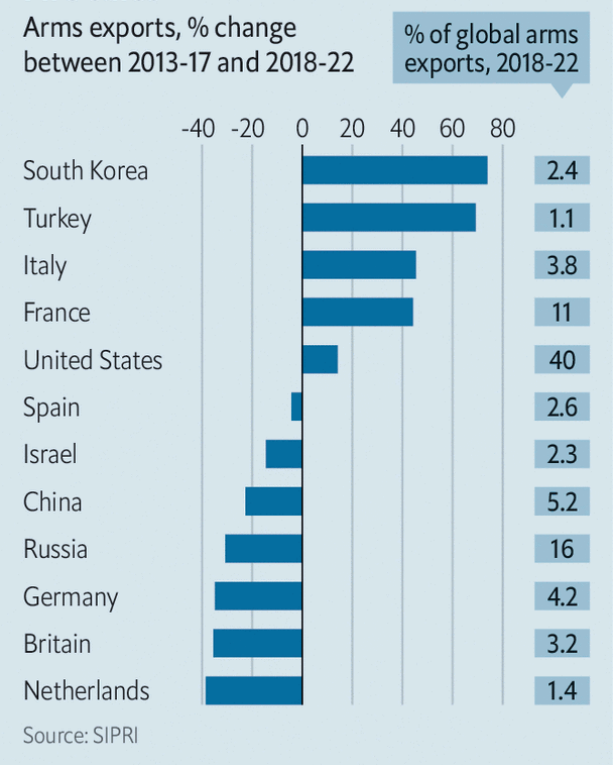
South Korea's arms sales have been rising rapidly. Between 2020 and 2024, South Korea emerged as the world's 10th-largest arms exporter. According to SIPRI,[91] South Korea's arms exports grew by 4.9% during this period. Poland accounted for the largest share of South Korea's arms export at 46%, followed by the Philippines at 14%, and India at 7%.[92] This coincides with South Korea's goal to become the world's fourth-largest arms exporter by 2027.[93]

South Korea, so far, produces a wide range of conventional and advanced technology-oriented weapons systems in the fields of aerospace, naval, ground, and electronic equipment.[94]

Brief History and Characteristics

South Korea's defense history is shaped by the Korean War (1950-53). After the armistice agreement, South Korea received intensive materiel support, training, and guidance from the US, which served as an alliance partner to South Korea.

Over the years, the presence of American troops on Korean soil has occasionally created uncertainty, originating from fears that they can be withdrawn at any time. This has raised concerns in South Korea about the reliability of US security commitments. In response, South Korea has sought to strengthen its defense capabilities. For example, President Park Chung-hee (1963-79) promoted reform to produce indigenous small arms under the Yulgok program. However, these efforts were met with resistance from the US which viewed South Korea's push for defense autonomy as overly ambitious.[95]



Despite various constraints, South Korea's defense industry has emerged as one of the world's major arms exporters. This success is rooted in four key factors[96]: persistent military

tensions with North Korea, a strategic partnership with the US, consistent domestic political support, and recent global demand driven by the Ukraine-Russia war. The ongoing tensions with North Korea, stemming from the absence of a peace treaty, have compelled South Korea to prioritize military readiness, with defense spending accounting for 2.72% (USD 46.3 billion) of its GDP in 2022.[97]

The US, as South Korea's key security ally, has provided significant weapons and technological assistance, although it has been cautious in transferring critical military technologies due to concerns over potential South Korean adventurism.[98] Domestically, both conservative and progressive governments have supported defense industry development, shaped by South Korea's historical experiences of colonization and foreign invasions. Finally, the Russia-Ukraine War has opened new export avenues, particularly with North Atlantic Treaty Organization (NATO) members, most notably Poland, boosting South Korea's global defense footprint.[99]

K-Defense: Progress Amid Problems

The persistent threat from North Korea has driven South Korea to develop a huge weapons manufacturing industry which is increasingly partnering with foreign nations. It is gaining a strong reputation for its ability to deliver arms swiftly, especially at a time when global defense suppliers are struggling with order backlogs.[100]

South Korea's cost-effective technology, efficient mass production capabilities, rapid delivery timelines, and reliable after-sales services have contributed to its success in becoming a strong player in the defense industry. It excels in key areas like tanks, howitzers, infantry vehicles, submarines, and light combat aircraft.[101]

The Korean government has also played a crucial role, with agencies such as the Agency for Defense Development (ADD), in upgrading technologies and supporting private manufacturers. These firms offer high-quality products at lower prices. As newer entrants in the global market, South Korean arms companies are also more adaptable, often offering favorable terms like technology transfers, responsive maintenance services, and localized production.[102]

Playing catch-up

South Korea's arms producers lag those of other major economies

(Global rank in terms of arms revenue, in billions of dollars, for 2022)

Rank	Company	Country	Arms revenue
1	Lockheed Martin Corp.	U.S.	59.4
6	BAE Systems	U.K.	26.9
7	NORINCO	China	22.1
10	Rostec	Russia	16.8
13	Leonardo	Italy	12.5
43	Mitsubishi Heavy Industries	Japan	3.3
48	**Hanwha Aerospace**	South Korea	**2.8**
67	**LIG Nex1**	South Korea	**1.7**
73	**Korea Aerospace Industries**	South Korea	**1.6**
98	**Hyundai Rotem**	South Korea	**0.8**

Source: Stockholm International Peace Research Institute

However, South Korea's technologies are competitive but largely second-tier, lacking depth in advanced areas like jet engines, avionics, and nuclear-powered systems. Also, Seoul heavily relies on US and German technologies, making it vulnerable to export restrictions.[103] Furthermore, cities like Changwon (Southern Gyeongsang Province)—a central hub for machinery and defense production,[104] responsible for 62.5% of South Korea's total USD 17.3 billion defense exports"[105] in 2022—are facing challenges such as economic slowdown and a lack of skilled workers due to population decline.

India-South Korea Defense Cooperation

India and South Korea have signed agreements in both space and defense. However, the defense partnership is more dynamic, with multiple MOUs and deeper institutional mechanisms.

India-South Korea's defense cooperation dates back to the Korean War (1950-53), when India sent medical units and led repatriation efforts. Today, mutual concerns of regional stability and a rules-based Indo-Pacific have bought both countries closer through high-level visits, defense dialogues, and defense-related agreements.

The first bilateral Defense Dialogue was held in 2003, followed by the Foreign Policy and Security Dialogue in 2005. That same year, a landmark MoU on Defense Industry and Logistics Cooperation was signed, establishing the Joint Committee Meeting (JCM) Framework. Additional platforms, such as the Defense Policy Dialogue (DPD), which was upgraded to the Secretary level and integrated into the 2+2 Dialogue in 2015, have further deepened collaboration.[106] Recognizing the collaboration, India established a dedicated defense wing in its Seoul embassy in 2012. In 2019, both agreed on a 'roadmap' to broaden arms industry cooperation, particularly in R&D.[107]

A fundamental aspect of the growing India-South Korea defense industrial partnership is the increasing involvement of the private sector from both countries. A breakthrough occurred with the K9 Thunder/Vajra-T self-propelled howitzer deal, marking South Korea's formal entry into the Indian market. Also, under Prime Minister Modi's 'Make in India' initiative, the order of 100 howitzers in 2017 was successfully delivered by 2021, with L&T as the Indian production partner. Though initially intended for use in desert terrains, the K9 Vajra performed beyond expectations in high-altitude conditions during the 2021 standoff with China, leading to additional orders.[108] In April 2025, Hanwha Aerospace signed a new USD 253 million contract with L&T for supplying components for 100 more K9 Vajra-T units to the Indian Army.[109]

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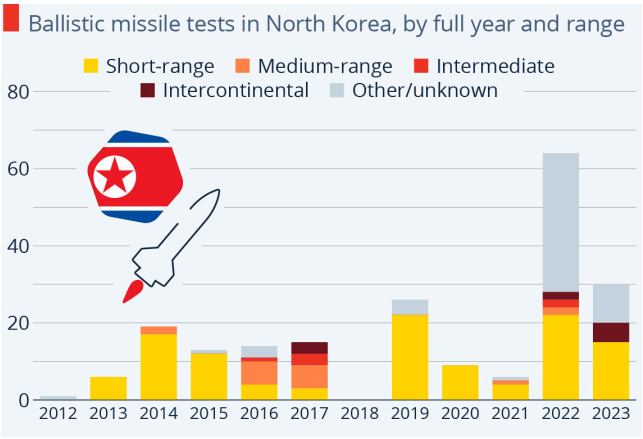
India-South Korea defense cooperation can aid India's push for indigenous manufacturing and reduce its dependency on foreign defense technologies. As South Korea enters the Indian defense market, it brings

Indian Defense Minister in K9 Vajra-T self-propelled gun, L&T Armored Plant in Hazira, Gujarat, January 16, 2020.
Photo: Ministry of Defense of India

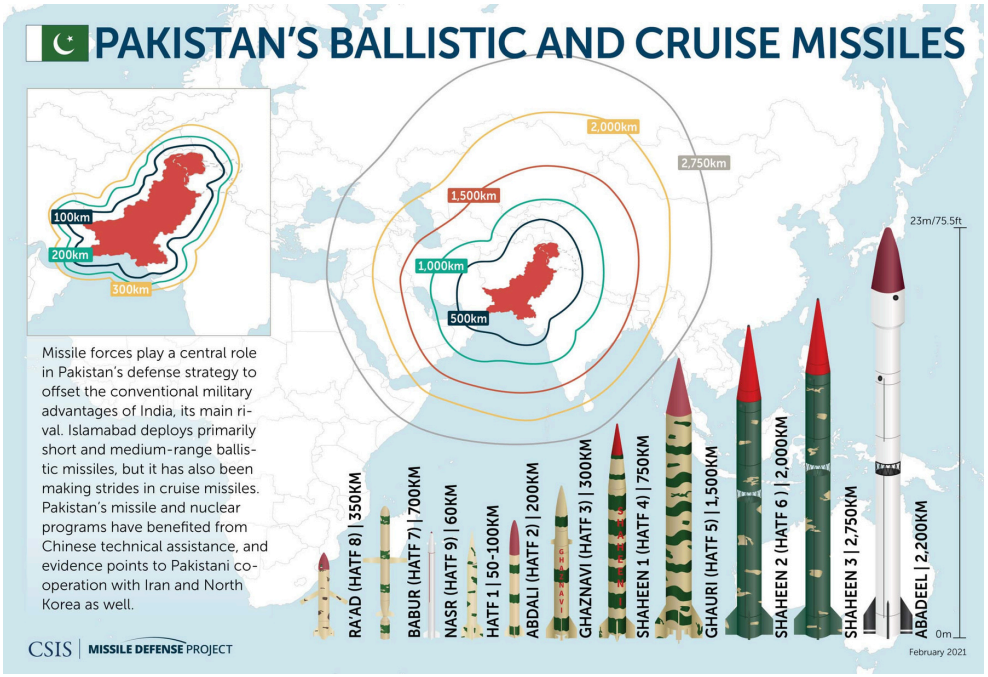
not just equipment but also critical technology transfer and localization. For example, in the K9 Vajra-T project between Hanwha Aerospace and L&T, over 50% indigenization was achieved in its first batch of 100 units. The second contract aims for 60% localization,[110] boosting India's domestic defense manufacturing. The strategic value of joint defense production was reflected when the K9 Vajra "demonstrated its performance advantage in terms of high hit rate and rapid reloading speed during the India-Pakistan border disputes in Kashmir in 2019."[111]

Geopolitical Imperatives

Both nations must recognize that their defense ties have become even more crucial in the face of evolving regional security threats. North Korea has formally abandoned peaceful unification as a national goal, revising its constitution to define South Korea as a "hostile" state and its "primary enemy"[112] This escalates the risk of confrontation on the Korean Peninsula. Meanwhile, India faces mounting security challenges from both Pakistan and China, particularly in the wake of the Pahalgam attack on April 22, 2025, and the subsequent 4-day conflict.[113]



Data Source: Nuclear Threat Initiative
Image Source: Statista



Additionally, China's ties with Pakistan poses security challenges for India, whereas its deepening ties with North Korea risks South Korea's regional stability. Such overlapping strategic concerns provides incentives to India and South Korea for closer space and defense cooperation. For instance, the strategic collaboration among North Korea, China, and Pakistan has historically contributed to the proliferation of missile and nuclear technologies, undermining peace and security.

In late 1990s, Islamabad reportedly procured components of North Korea's Rodong missiles and rechristened it as the intermediate-range Ghauri missile. Later, Dr. A.Q Khan, known as the father of Pakistan's atomic weapons program, visited North Korea multiple times and finalized a clandestine arrangement under which Pakistan supplied uranium-enrichment technology in exchange for ballistic missile systems.[114] As per US sources, Pakistan Energy Commission (PAEC) supplied restricted nuclear materials such as Monel and Inconel, procured from Chinese entities.[115]

> "Notwithstanding India's historical and defense ties with Russia, the deepening ties of Moscow, Beijing, and Pyongyang have raised concerns in both Seoul and New Delhi. The threat is more prominent for Seoul as North Korea and Russia signed a Comprehensive Strategic Partnership agreement in 2024.

Further, China played a vital role in transferring technical know-how for a nuclear weapons program to both Pakistan and North Korea. While reports of direct Chinese involvement in North Korea's nuclear program remain contested, several investigations confirmed that China supplied dual-use materials and components to support nuclear program.[116] With Pakistan, China has shared weapons-grade uranium and technical expertise of gas centrifuge.[117] Furthermore, between 2020-2024, Pakistan imported 81% of Chinese weapons, making China its biggest weapons supplier. During the 2025 border clashes, Pakistan deployed Chinese-origin J-10C fighter aircraft against India.[118]

Moreover, the emerging alignment of Russia, China, and North Korea adds an additional layer of complexity. These three nations have accelerated their cooperation after the Russia-Ukraine War in 2022. Notwithstanding India's historical and defense ties with Russia, the deepening ties of Moscow, Beijing and Pyongyang have raised concerns in both Seoul and New Delhi. For South Korea, the threat is more prominent as North Korea has strengthened its military ties with Moscow with the signing of Comprehensive Strategic partnership in 2024. It has led to the deployment of North Korean troops to support Russia in exchange of Russian support for Pyongyang's ballistic missile programs.[119] China, too, has bolstered its military ties with Russia through joint drills and naval exercises.[120]

Challenges

There are common challenges which linger in both space and defense cooperation between India and South Korea.

Both countries face political transactional costs such as trust deficits, communication issues, and a lack of sustained attention toward each other. India tends to view South Korea instrumentally, while South Korea often perceives India as a market. Consequently, even with strong intent, operationalization of projects remains unaccomplished. Most of the times, deals are hindered due to tough negotiations with Korean private companies and mismatches in expectation from the Indian side. Korean companies are driven by goals of quickly capturing the market share and generating profits within a short timeframe of 2-3 years. There is also a strong concern over the intellectual property protection and technological duplication, which often shapes their commercially-driven approach with foreigners. On the other hand, Indian stakeholders lacks adequate preparatory research, leading to generalized discussions rather than targeted engagement on specific technology.

Further, when Korean startups or companies enter India, they face difficulty in understanding the Indian business system. Many lack awareness about India's price sensitivity and fragmented decision-making structures in B2B sectors. They also face problems due to lack of local partners as it delays trust-building and decision-making processes. Sensitive sectors like space and defense have high-clearance requirements and lengthy procurement cycles which complicates the process for Korean investors. Additionally, tech-related Korean companies are reluctant to share technology due to weak IP rights in India. On the Indian side, this reluctancy is often perceived as a lack of flexibility, especially given the diverse options of multiple domestic and international firms offering similar technologies.

Challenges in Space cooperation

Despite the growing potential, space cooperation between India and South Korea has remained limited.

One key challenge has been the historical divergence in their international space alignments. For instance, South Korea has relied heavily on the US for space technologies, except when it turned to Russia, post-Cold War, to develop its space launch vehicle due to the US export controls. India's space program was initially developed in collaboration with the Soviet Union during the Cold War. Nonetheless, over the decades, India built a self-reliant space capability through ISRO. Consequently, South Korea did not initially perceive India as a viable partner in the space sector. It viewed India as being in early stages of developing key space technologies (SLVs, navigation satellites, and manned spaceflights) and as largely dependent on the Soviet

Union for technological support.[121] These historical allegiances continue to influence present-day choices, with South Korea consistently prioritizing alignment with the US, while India maintains a more autonomous and diversified approach to space partnerships.

Additionally, although South Korea possesses the foundational capabilities to advance its space program independently, a substantial gap remains between South Korea and the world's leading space powers.[122] Despite remarkable achievements like Naro, Nuri, and Danuri, South Korea has not yet been able to translate these accomplishments into significant economic benefits or solutions to societal challenges, like India. For example, South Korea lacks an indigenous satellite navigation system and currently relies on the US Global Positioning System (GPS).

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India's space sector faces significant challenges in funding, particularly for start-ups. Over 420 startups registered with INSPACe struggle to secure early-stage and growth-stage funding.[123] Additionally, the process for foreign companies to secure a launch with ISRO is lengthy and complicated, often taking 12 to 24 months through IN-SPACe, whereas SpaceX in the US offers a significantly shorter wait time of 6 to 12 months.[124] The delay is caused by both bureaucratic and a capacity-related issue. SpaceX benefits from a streamlined booking process, higher launch frequency, highly automated systems, and the availability of heavy-payload launch vehicles like Falcon 9 or Falcon Heavy. In contrast, ISRO's reliance on smaller payload vehicles like PSLV and GSLV, and the requirement of foreign companies to undergo multiple layers of security clearances and regulatory approvals, had significantly contributed to lower launch numbers. In 2024, ISRO carried out only nine launch missions[125] (only five orbital launches), whereas the US achieved 134 orbital launches.[126]

Challenges in Defense cooperation

Despite the flurry of MoUs, dialogues, and proposed projects, India-South Korea defense cooperation has yielded few tangible outcomes beyond the success of the K9 Vajra-T program. Several promising ventures have been stalled or cancelled due to differences in procurement requirements, delays, and other bureaucratic hurdles. For instance, plans for South Korea's Kangnam Corporation to jointly build twelve minesweepers with Goa Shipyard Limited were cancelled.[127] Similarly, South Korea's Hanwha Ocean also withdrew from India's Project-75I, a naval acquisition initiative by the Ministry of Defence to procure six advanced diesel-electric attack submarines equipped with the Air-Independent Propulsion (AIP) systems, which enable the submarines to stay submerged for up to two weeks.[128]

Also, there is a structural divergence in the government-private sector relations in both countries. In South Korea, key technologies are held by private companies, which enjoy significant autonomy, prioritize commercial interests, and hold strict control over intellectual property. Whereas, in India, the private sector

aligns more closely with government policies, especially in sensitive sectors like defense. The classic example of this divergence is the cancelled mine countermeasure vessel (MCMV) deal between the state-owned Goa Shipyard Limited and South Korea's Kangnam Corporation. Despite the government-level interest, the deal was put off in 2018, after Kangnam refused to accept norms related to IP rights and production support guarantees.[129] This underscores the need for the Korean government to play a more proactive role in encouraging their private companies to look beyond profits and form long-term partnerships.

Another point of divergence lies in India's willingness to pursue exports through joint ventures, contrasted with South Korea's hesitancy in sharing export rights.[130] A key example is Hanwha Defense, which has been hesitant to allow exports of co-developed platform like the K9 Vajra, despite being manufactured in India with L&T. Instead of exporting from India, Hanwha prefers to handle exports directly, which reinforces the perception that the India-South Korea ties are transactional, rather than strategic. In contrast, the Brahmos supersonic cruise missiles, jointly developed by India and Russia's has been exported to the Philippines.[131]

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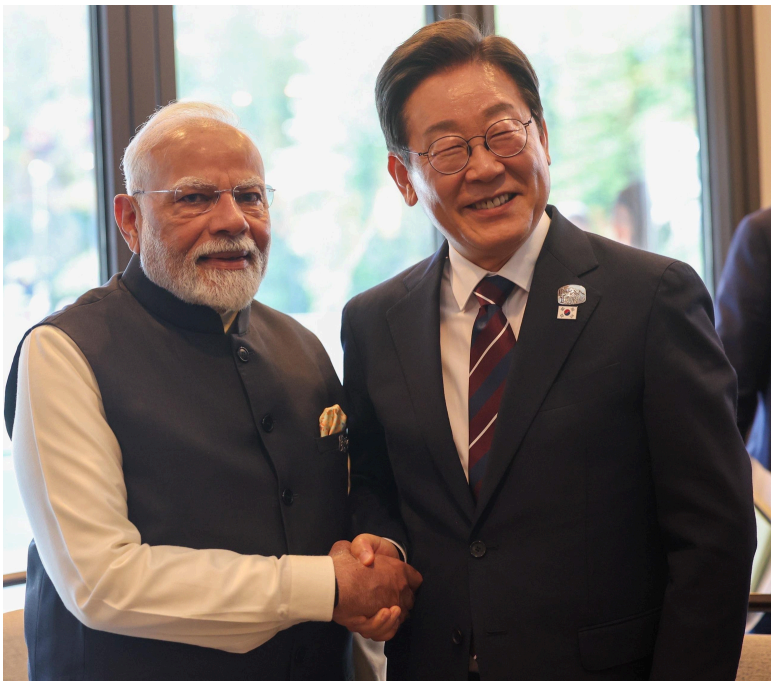
Going forward, South Korea must consider factors that could impact its relations with India. Reports indicate that Pakistan imported a Hanwha KH179 howitzer, two 40mm grenade launchers, and Poongsan 155mm rounds in 2017, for trial purposes.[132] In the same year, India placed an order for 100 K9 Vajra-T howitzers from Hanwha. These limited Pakistani imports did not lead to any major orders. However, India maintains that Pakistan undermines regional stability and has urged nations not to engage military "with a known sponsor of cross-border terrorism."[133] While South Korea is not exporting weapons to Pakistan, its past interactions may remain a point of concern for India.

These challenges raise a question of whether India and South Korea truly perceive each other as strategic defense partners or if their engagement remains largely symbolic or transactional.

India-South Korea Space and Defense Cooperation

Area	Current	Untapped Opportunities
Policy Framework	MoUs on Defense Logistics, Defense Industry Cooperation, Defense Dialogue, Joint Committee Meetings (JCM)	Formalize security arrangements; expand scope to shipbuilding, space situational awareness, cyber defense, and AI-enabled systems
Joint Projects: Space	ISRO-KARI MoU on peaceful use of outer space, lunar exploration, satellite navigation, space science	Strengthen ISRO-KASA MoU; co-develop satellite missions, space transportation, satellite data sharing, and joint astronaut training
Joint Projects: Defense	Limited arms trade (e.g., K-9 Vajra-T self-propelled howitzer)	Joint development of naval platforms, missile defense, drones, AI-integrated systems, and indigenized systems under Make in India
Regional Strategy	Act East Policy, New Southern Policy, Indo-Pacific Strategy	Align approaches on South China Sea, maritime domain awareness, AI in warfare, resilient supply chains, critical technologies; support Atmanirbhar Bharat and Global Pivotal State vision
R&D	Minimal collaboration	Establish ISRO-KASA research centers; space-defense startup bridge; tech-talent exchange corridor; co-fund innovation hubs



PM Modi met President Mr. Lee Jae-myung on the sildelines of the G7 summit in Canada in June 2025. Source: NarendraModi on X

Policy Recommendations

India and South Korea stand at a strategic crossroad, where fruitful cooperation is not just desirable but essential. Both countries are democracies with no animosity towards each other. Also, both share a troubled neighborhood and common security concerns shaped by the North Korea-China-Pakistan nexus.

Over the years, India and South Korea have signed multiple agreements but most of them remain underutilized. Also, India-South Korea defense and space cooperation continues to face challenges, arising from unsecure IP rights, regulatory friction, differing perceptions and expectations, and many more.

On the other hand, India's defense partnerships with other countries like Russia and France have produced concrete results, including the BrahMos missile, Sukhoi, and Rafale fighter jets. Similarly, South Korea's long-standing defense alliance with the US has ensured the presence of 28,500 American soldiers in South Korea, along with the provision of cutting-edge defense systems, such as the Terminal High Altitude Area Defense (THAAD).

Nonetheless, with the Indo-Pacific becoming a theatre of militarization and provocations and with India pursuing technology indigenization and South Korea seeking to diversify partners, a unique window of opportunity is emerging. Space and defense offer promising avenues for both countries to collaborate and strengthen their civil and military preparedness. By bridging existing gaps and co-developing technologies, both can gain an edge in security, innovation, and global competitiveness, making their partnership truly 'strategic'. Together, both can not only enhance bilateral security but also contribute to regional stability with innovation and resilience.

The following recommendations aim to deepen India-South Korea strategic cooperation in space and defense domains. They are categorized by short, mid, and long-term timelines. Key stakeholders may include Indian and Korean public agencies such as ISRO, IN-SPACe, Physical Research Laboratory (PRL), DRDO, ADD (South Korea), Ministry of External Affairs, Invest India (under Ministry of Commerce and Industry), Korea SMEs and Startups Agency, KASA, KARI, Ministry of Foreign Affairs (South Korea) Embassy of Republic of Korea in India, private companies like Hanwha Group and Larsen & Toubro, academic institutions like Indian Institutes of Technology and Korea Advanced Institute of Science and Technology, etc.

Common challenges to implementation include bureaucratic delays, IP enforcement concerns, technology transfer restrictions, export control regulations, budgetary constraints, and need to harmonize global standards.

Short-Term (2025-26)

- **Trust-building and Business Facilitation Initiatives:** Despite a change in political leadership in South Korea, there remains bipartisan support for stronger ties with India. The new administration in Seoul has expressed interest in deepening cooperation with India, providing an opportunity to overcome political transactional costs.

- **Korean government should encourage its firms to adopt a long-term, partnership-oriented approach toward India.** The government may provide financial incentives for Korean companies if they enter into joint ventures with Indian partners.

- On the **Indian side, the government needs to facilitate structured orientation programs for Korean companies, particularly focusing on India's regulatory environment, business norms, legal toolkit, and cultural landscape.** These could be conducted through committed incubators or platforms like Invest India or The Circle FC. The government should establish a dedicated grievance redressal mechanism to resolve issues related to IP rights quickly. Also, the government must facilitate a matchmaking platform jointly managed by platforms like Invest India and KOTRA, and a verified partner registry to help Korean firms identify reliable Indian partners and reduce risks associated with market entry.

- Both countries also need to **encourage Next-generation engagement** through people-to-people and academic exchanges. It can be done by expanding exchange programs among IITs, KAIST, ISRO, KASA, defense think tanks, DRDO, DAPA, etc.

- **Establish a High-Level Institutional Mechanism:** India and South Korea should establish Joint Space Cooperation Committee, where ISRO and a newly-established KASA can regularly coordinate on space exchanges, scientist exchanges, joint research fellowships, and shared use of R&D facilities. India already maintains similar high-level mechanisms with countries like France, USA, Japan, and Russia, which have been effective in sustaining long-term space cooperation. Institutions like ISRO's Physical Research Laboratory (PRL) and KASA's Space Camp can serve as platforms to facilitate training programs, researcher exchanges, and collaborative technology development initiatives for scientists, young researchers, and engineers from both countries.

Mid-Term (2026-30)

- **Establish a Startup Bridge:** South Korea's emerging companies can leverage platforms like Invest India and Startup India to enter the Indian market with innovative tech-based solutions. For instance, the space sector offers significant potential for collaboration. Korean startups with their advanced sensors, machinery for satellites, and precision technologies can present ideas to institutions like ISRO and contribute to civil applications such as rainfall measurement, humidity tracking, and climate monitoring. For defense, which requires high-precision, South Korea can contribute advanced technologies such as AI-enabled eye-tracking systems for training and combat, cybersecurity applications for critical infrastructure protection, and secure semiconductor solutions for military-use. This can boost public-private partnerships, combining Korea's advanced technologies with India's strengths in data processing and analytics.

- **Collaboration in Downstream technologies and Space Explorations:** As private players like SpaceX redefine benchmarks in satellite launch efficiency, India and South Korea may find greater strategic value in deepening collaboration on downstream space technologies including Earth observation, satellite communications, navigation systems, etc.

- **India can also support South Korea's Moon and Mars landing plans** by sharing its experience in cost-effective deep space missions, such as Chandrayaan and Mangalyaan. Both can collaborate in

planning, payload development, and navigation support, which will reduce costs and strengthen scientific exchange and technological interoperability.

- **Space Debris Mitigation and Norm-Setting:** India and South Korea can collaborate on space situational awareness (SSA)[134] and space debris mitigation, addressing emerging risks like weaponization, orbital pollution, and safety hazards. By pooling their technological partnership, both can develop debris tracking, avoidance, and removal technologies. Both can establish a joint platform for tracking and sharing real-time data on orbital debris, co-develop low-cost debris removal, and coordinate diplomatic efforts in multilateral forums to support a rules-based space order.

- **Promote Sub-System Level Defense Collaboration:** India and South Korea may opt for collaboration in sub-systems and components instead of full-platform acquisitions. India should also focus on co-developing and integrating modular technologies (sensor system, fire control units, communication modules, and unmanned platforms) into its existing defense infrastructure. Additionally, India should engage with emerging Korean defense SMEs and startups, which are more flexible, innovation-driven, and open to joint ventures. This will reduce costs, enhance interoperability, and decrease dependency on single vendors.

Long-Term (2028-35)

- **Joint Development of Satellite Navigation Systems:** By 2035, South Korea plans to develop a satellite navigation system to provide centimeter-level accuracy across the Korean Peninsula, similar to Japan and India. Currently, it relies on US and international satellites for Global Navigation Satellite System (GNSS) services, where un-augmented GPS has up to 10-meter error radius—too imprecise for technologies like self-driving cars and UAV drones.[135] Whereas, India launched the Indian Regional Navigation Satellite System (IRNSS) satellite from 2013 to 2018, which provides public navigation services. India's expertise in building a regional navigation system could support South Korea's efforts to develop its own.[136]

- **Initiative for India-South Korea Maritime Cooperation:** Both countries can jointly establish this initiative that integrates space, defense technology, and joint military exercises to secure maritime commons and regional stability in the Indo-Pacific region. Both can co-develop satellite-based surveillance systems and deploy these technologies for real-time monitoring of key Indo-Pacific routes, EEZs, and grey-zone threats.

- **Upgrade the anti-piracy, search, and rescue exercise, Sahyog-Hyeobryeok**, to improve maritime security cooperation.[137] Additionally, South Korea can benefit from India's liberalized defense manufacturing policies, including the 'Make in India' initiative, by partnering with Indian firms. For instance, both can collaborate on the joint development and production of naval vessels, combining South Korea's advanced shipbuilding and port building expertise and India's expanding maritime infrastructure.

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Cover Image: K9 Vajra, a 155mm, 52-caliber self-propelled howitzer, a variant of the South Korean K9 Thunder, produced in India by Larsen & Toubro (L&T), in collaboration with South Korea's Hanwha Aerospace, seen during a Republic Day parade in New Delhi. Source PTI

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