

New Frontiers: Taiwan's Space Industry

Advancing National Interests through International Space Cooperation

By Kayla Orta

At a global scale, national governments are increasingly calling attention to the future promise of today's rapidly expanding international space industry. With the global space economy expected to reach upwards of \$1.8 trillion by 2035,¹ many nations are looking to secure an early seat at the table. Taiwan—internationally renowned for Taiwan Semiconductor Manufacturing Company's (TSMC) advanced semiconductor industry—is no exception.

Taiwan's Rising Space Industry

In recent years, the Taiwanese government has instituted policies aimed at expanding Taiwan's role in the global civil space industry ecosystem. While previously targeting satellite technology for scientific research purposes, Taiwan now seeks to enhance its national and economic security through the indigenous development of advanced, high-resolution optical remote sensing satellites (FORMOSAT-8), Synthetic Aperture Radar (SAR) satellites (FORMOSAT-9), and, in the long term, establishment of its own low Earth orbit (LEO) satellite communications constellation.

Additionally, Taiwan is working to shore up close partnerships for international collaboration in space-industry establishment and development. While many nations are highlighting space autonomy—aiming to secure indigenous supply chains—regional and cross-regional partnerships will be increasingly important in a high-demand and crowded industry. To seize new

opportunities in the civilian space sector, Taiwan must move smartly to expand its nascent space initiatives. Lessons learned from South Korea's and Japan's space industry trajectories will be pivotal for in-region comparisons; and, globally, renewed cooperation with the United States and European nations will be key.

From Then to Now: Taiwan's Industry Landscape

Since the 1990s, Taiwan's government has aimed to establish its space technology industry by fostering the local talent and skills needed to push its domestic science and technology industry forward. Unlike other nations, which operate under UN collective policy initiatives for critical and emerging technology, Taiwan—due to its historic and political isolation—sought avenues of space development independently or in bilateral coordination with trusted, likeminded partner nations.

On October 3, 1991, the Executive Yuan approved the "Space Technology Long-term (15 years) Developmental Program", creating the National Space Program Office (NSPO).² Into the early 2000s, NSPO demonstrated early collaborative scientific research capacity-building through the successful completion of the Formosa Satellite (FORMOSAT) series 1, 2, and 3 programs. These early LEO satellite programs mainly supported scientific experiments, remote sensing, communication, and climate/weather analysis.³

During this period, Taiwan's space programs relied heavily on technology transfers with the United States and France. Launched in April 2006, the FORMOSAT-3, also known as the Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC), was the first joint US-Taiwan program consisting of a six-microsatellite LEO constellation.⁴ Within 30 years of its establishment, Taiwan's space industry demonstrated its first indigenously designed and manufactured satellite⁵ in the successful launch of FORMOSAT-5 and worked jointly with US industry for the FORMOSAT-7/ COSMIC-2 mission, which was the world's first operational radio occultation satellite constellation for global weather and atmospheric data collection.⁶

In May 2021, the Legislative Yuan passed the Space Development Act, marking Taiwan's most recent phase in developing its national space capacity.⁷ The act reestablished Taiwan's leading space agency, formerly the NSPO, as the Taiwan Space Agency (TASA) in 2023.⁸ In order to further national security and industry imperatives, Taiwan's government called upon TASA to rapidly develop new space technology, including Taiwan's first LEO communication satellite initiative, the Beyond 5G LEO Satellite (B5G), and advancements in its remote sensing satellites, the FORMOSAT-8 and 9 programs.⁹

Looking to the future, there are both opportunities and challenges ahead for Taiwan's burgeoning space program. Importantly, Taiwan will need to balance its internal policy-driven advancements in light of ongoing debates regarding trade-offs in interdependency versus collaboration in space technology supply chains.¹⁰

Indo-Pacific Middle Power Players: South Korea and Japan

A domain of both economic and security competition, the space sector represents a difficult breakthrough industry for late-developing nations looking to rapidly expand their civil space industries. As Taiwan aims to ensure strengthened autonomy for its local space industry, Taipei should look to US partners and regional players—South Korea and Japan—as useful examples of space advancements and potential avenues for cooperation.

South Korea

South Korea's pursuits in space science and technology began in the 1980s, though with limited industry success. Recently, however, the Korea Aerospace Research Institute (KARI) is making great strides in developing the nation's own indigenous satellites and launch vehicles. Following a failed test in October 2021, South Korea's three-stage KSLV-II Nuri rocket, carrying a 162.5-kg (358 lbs.) payload, successfully placed multiple satellites into orbit in June 2022. The successful launch marked South Korea as the seventh country in the world—after Russia, the United States, France, China, Japan, and India—to develop an space launch vehicle for over 1-ton satellite payloads.¹¹

Upscaling domestic space initiatives, on May 27, 2024, South Korean President Yoon Suk Yeol announced the establishment of the Korea AeroSpace Administration (KASA), alongside plans to invest upwards of \$72.5 billion (KRW 100 trillion) by 2045.¹² Moving forward, South Korea aims to further establish its domestic space industry through investing in reusable launch vehicle technology (KSLV-III), domestic launch facilities, new high-resolution imaging satellites, and future lunar and Martian landers by 2032 and 2045 respectively.¹³

Japan

From its origins in the 1950s, Japan's space program has focused on science and technology research and the peaceful, non-military advancement of its space technology, including satellites, probes, and a joint US-Japan lunar rover. On February 11, 1970, Japan successfully launched its first satellite, Ohsumi, signifying significant technical advancements in US-Japan space cooperation. After a series of failed programs in the 1990s and early 2000s, Japan reorganized its internal agencies, consolidating three pre-existing agencies to create the Japan Aerospace Exploration Agency (JAXA) in October 2003.¹⁴

Today, Japan's well-established space industry is internationally recognized. Its government spending on space programs is ranked third highest in the world—surpassed only by the United States and China—at \$9.8 billion in 2024. In January 2024, Japan, with its Smart Lander for Investigating Moon (SLIM),¹⁵ became the fifth country globally to place a lander on the moon. In April 2024, the United States' NASA and Japan's JAXA announced a joint agenda for the development of a pressurized lunar rover by approximately 2031.

South Korea and Japan are exploring avenues for bilateral partnerships in advancing satellite navigation systems. In March 2024, the two nations agreed to collaborate on developing South Korea's Korean Positioning System (KPS) and Japan's Quasi-Zenith Satellite System (QZSS).¹⁶ While Taiwan's Global Navigation Satellite System-reflectometry (GNSS-R) is still early in its design and implementation,¹⁷ Taiwan's interest in this area presents an opportunity for South Korea-Japan-Taiwan trilateral collaboration on research toward enhancing satellite designs for precision positioning, navigation, and timing (PNT) for civilian use.

Partnering on Space: Collaboration Opportunities

Amid US-China competition, the civil space market is shifting. For Taiwan, there are opportunities for increased collaboration with the United States and European nations—especially as Taipei aims to demonstrate industry capabilities and signal its potential within the international space technology supply chain.

United States

Since the United States does not recognize Taiwan as a sovereign state and lacks formal diplomatic relations with Taipei, the National Aeronautics and Space Administration (NASA) does not have authority to enter into formalized bilateral partner programs with Taiwan. However, NASA has partnered with TASA on localized space technology testing over the years. Recently, the US legislature has shown interest in establishing avenues for bilateral partnerships and industry-to-industry support for Taiwan's rising space program, to bypass the obstacles to formalized space partnerships.¹⁸ In March 2024, a bipartisan, bicameral bill, titled the "Taiwan and American Space Assistance (TASA) Act", was introduced in the US Congress.¹⁹ Aimed at expanding cooperation in US-Taiwan civilian space activities, the bill outlines areas of possible cooperation in satellites, space exploration, and atmospheric and weather technology. While this bill remains in review, the introduction of bipartisan legislation suggests there may be room for future and further US-Taiwan cooperation in the space economy moving forward.

European Nations—France and Poland

Additionally, there are opportunities for Taiwan to expand its partnerships with European nations. The European Space Agency (ESA), convening 23 member

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states, leads Europe’s growing space industry, and represented 11 percent of global civil space budgets in 2023.²⁰ While Taipei does not hold diplomatic relations with the EU, there are recent openings for Taiwan’s bilateral partnership on space technology development, most specifically with the well-established French and emerging Polish industries.

Most recently, TASA and the French National Space Agency (Centre national d’études spatiales, CNES) signed a Memorandum of Cooperation in 2023, renewing the well-established partnership. As part of Taiwan’s ridesharing plans for FORMOSAT-9, CNES won TASA’s scientific payload bid and will provide a space weather monitoring system.²¹

In December 2024, TASA and the Polish Space Agency (POLSA) signed their first bilateral Memorandum of Understanding, which aims to target collaboration in “space transportation systems, space situational awareness (SSA) technologies, and remote sensing technologies”.²² As newcomers to the space industry, Poland and Taiwan could work jointly to achieve advancements in telecommunication satellites and the application of SSA monitoring technology to detect space debris.

Overall, the United States, France, and Poland can serve as both continuing and new opportunities for Taiwan’s growing space industry.

Policy Recommendations

In its pursuit of space autonomy, Taiwan will need to look closely at domestic industries’ strengths and critically judge where to build up locally and where to incorporate foreign supply chains.

Where possible, Taipei should lean into local, regional, and cross-regional avenues for expansion, collaboration, and partnerships.

Domestic Public-Private Policy:

- Under the Space Development Act, Taiwan’s government should collaborate closely with civil industry to build localized autonomy and secure early footholds in satellite design, manufacturing, and launch vehicle development.
- Taiwan’s space policy development should prioritize a unified, multi-stakeholder approach—linking government, academia, and leading industry—and ensure cross-sector resources and knowledge-sharing.
- Taiwan should invest in upscaling satellite production, enhancing earth observation and remote sensing technologies, and evaluating the long-term viability of launch vehicle programs and testing sites.

Regional Engagement:

- Collaboration with like-minded middle powers—such as South Korea, Japan, and potentially India—can support joint science and technology development. The door should remain open for other newly developing space nations, including Indonesia, the Philippines, and Singapore.
- Specifically, Taiwan’s TASA should pursue trilateral cooperation with KASA and JAXA to advance research in GNSS technology.
- Building regional research networks with key academic institutions like Korea Advanced

Institute for Science and Technology, the University of Tokyo, and the National University of Singapore will help cultivate next-generation space talent in the Indo-Pacific region.

Cross-Regional Collaboration:

- International collaboration should continue to play a critical and central role in Taiwan's advancing civil space industry development.
- Taipei should lean into pre-existing and new cross-regional space partners, including strengthening collaborative projects with NASA, the EU's ESA, and, in particular, France's CNES and Poland's POLSA.
- Moving forward, Taipei should pursue avenues to publicly demonstrate its technical advancements in the space sector, including participation in and hosting of international public-private civilian space summits.

Overall, Taiwan's policy-driven initiatives in the civilian space domain, though nascent, present windows of opportunity. As concerns grow over China's influence, countries may turn to partners like Taiwan for supply chain collaboration. Looking forward, Taiwan will need to leverage national strengths, recognize inherent industry weaknesses, and enhance international cooperation both within and beyond the Indo-Pacific region to attain a foothold in the international space ecosystem.

Endnotes

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