SPACE COMPANIES AND STATES
A TWO-HORSE RACE?

edited by **Clelia Iacomino** and **Francesco Rosazza Boneitin**

ISPI

3. India's Growing Stature in the Global Space Arena

Ajey Lele

At the time of independence in 1947, India's economic structure carried the deep imprint of nearly two centuries of British colonial rule. The country's underdeveloped economy was characterised by very low per capita income, widespread poverty and inadequate access to food, shelter and clothing. The situation was compounded by large-scale unemployment a literacy rate of 18%, an investment rate of around 9% of its GDP, life expectancy at birth of 32 years, an annual population growth rate of 1.25% and an average annual GDP growth rate of around 3%[1]. *Vis-à-vis* this context, many were surprised that a developing country like India would invest in the space sector despite its major socio-economic challenges, as it was seen as an exclusive priority for wealthy nations. However, the Indian establishment managed to effectively exploit the technological legacy in science and technology left by British-era institutions. During the 1930s and 1940s, technology was placed at the heart of the nation-building effort, leading to the establishment of major scientific institutions that regarded, among others, space[2].

[1] M. Guruswamy, "How did we do in 75 years", *Deccan Chronicles*, 18 August 2022; A. Pandey, "A critical study of the trends in Indian economy since independence and the analysis of the factors responsible for those changes with future prospects", November 2024.

[2] D. Arnold, "Nehruvian Science and Postcolonial India", *Isis*, vol. 104, n. 2, June 2013.

The Development of India's Space Sector

After independence, the Indian scientific community recognised the importance of experimenting with sounding rockets as a precursor to the development of a national space programme. However, this effort unfolded during the Cold War, when rocket technology was treated as a closely guarded strategic secret, which forced India to adopt a diplomatically astute approach. At the time, major international scientific initiatives were under way, including the International Indian Ocean Expedition (IIOE) and the International Quiet Sun Years (IQSY): one of the main challenges for these projects was the absence of equatorial launch sites available for the collection of atmospheric data. Therefore, New Delhi proposed to the United Nations that its territory could serve as a suitable equatorial launch site: this is how the Thumba Equatorial Rocket Launching Station (TERLS) was established in 1962.

Then, India's space agency, the Indian Space Research Organisation (ISRO), was founded in 1969 and successfully launched its inaugural satellite Aryabhata in April 1975, on board of a Soviet Kosmos rocket. Then, in July 1980, India became a full-fledged spacefaring nation with the successful launch of the Rohini satellite, propelled into orbit using the nation's first indigenous rocket, the SLV-3 (Space Launch Vehicle 3).

Subsequently, ISRO concentrated its efforts on the development of SLVs, particularly throughout the 1980s-90s. The Polar Satellite Launch Vehicle (PSLV), which was designed to place satellites in the Low Earth Orbit (LEO), became fully operational around 1994. In 1991, in order to be able to deploy heavy satellites in the geostationary orbit (GEO), ISRO concluded an agreement with the Russian company Glavkosmos – the manufacturer of the Russian Soyuz. However, the situation triggered concerns regarding the Missile Technology Control Regime (MTCR), which led to a compromise that blocked technology transfer to replicate cryogenic engines in India, but

still allowed New Delhi to purchase seven Russian engines.[3] Nevertheless, the transfer of technology was prevented. ISRO has also developed a small satellite launch vehicle (SSLV) to undertake launches of small satellites (500 kg and below) to LEO. ISRO has also developed a small satellite launch vehicle (SSLV) to undertake launches of small satellites (500 kg and below) to LEO.

ISRO devoted almost twenty years to the development of sophisticated cryogenic systems and has recently attained the capability to launch satellites weighing in excess of 4,000 kg to geostationary transfer orbit (GTO) using its LVM3 launch vehicle. These developments signifie a substantial technological advancement, superseding the constraints previously imposed by earlier limitations. It is evident that, over time, India has established a comprehensive space programme supported by a robust network of remote sensing, communication, navigation and scientific satellite systems.

From Deep-Space Exploration to Strategic Posture: Understanding India's Space Ambitions

India is nowadays recognised as an Asian space power, showing resilience and strong innovation capacity.[4] It has successfully launched satellites for astronomical purposes and to study the solar environment. The country has also made significant progress in the field of satellite navigation. The Indian Regional Navigation Satellite System, now operational as NavIC, provides precise positioning services over India and the surrounding region, offering an indigenous alternative to global systems such as GPS and GLONASS. Unlike global constellations, NavIC is designed to meet regional civilian and strategic

[3] A. Lele, "Is ISRO's 'cryogenic curse' finally over?", *The Space Review*, 22 July 2019.

[4] A. Travelli, "The Surprising Striver in the World's Space Business", *The New York Times*, 4 July 2023.

requirements, thereby reinforcing national autonomy in critical infrastructure. However, the programme encountered several issues due to a few launch failures and some technical problems with the atomic clocks supplied by the European manufacturer Spectra Time.

Beyond utilitarian applications, India has pursued an ambitious deep-space exploration agenda. The launch of its inaugural Moon mission Chandrayaan-1 in October 2008 led to the discovery of water molecules on the Moon. This was followed by the Mars Orbiter Mission (MOM) in 2013, which made India the first country to reach the Mars orbit on its first attempt. The successful soft landing of Chandrayaan-3 in August 2023 confirmed India as the first nation to land near the Moon's South Polar Region, significantly enhancing its global scientific standing. India is currently preparing for its next lunar mission, which is scheduled to be a sample return mission.

India's approach to space for strategic and security purposes has been meticulously calculated, incremental and largely defensive. While it demonstrated counter-space capability through an anti-satellite test in 2019, New Delhi continues to emphasise responsible behaviour in outer space. India remains an active participant in international multilateral forums such as the United Nations Committee on the Peaceful Uses of Outer Space, the Inter-Agency Space Debris Coordination Committee and the Conference on Disarmament in Geneva.

Space Commercialisation and the Rise of India's Private Space Sector

Since its first orbital launch in 1975, India's national space programme has carried out 134 spacecraft missions and 105 launch missions, putting a total of over 130 national satellites into orbit.[5] Contextually, increasing commercialisation of the

[5] Indian Space Research Organization, Missions Accomplished, latest access: 3 February 2026.

sector has started to emerge as a trend in the country's industrial ecosystem. In 1992, ISRO established its first "commercial and marketing" arm, Antrix Corporation: structured as a private limited company, but with ownership fully retained by the government's Department of Space, Antrix was tasked with bridging the developing economic and industrial expertise of ISRO with the global market.[6] The company quickly established itself as the major private space company in India, offering space manufacturing and services from launches, to leasing satellite transponders and offering consultancy activities, remaining the sole pole at the top of its field until mid-2010s. In 2019, New Delhi decided to expand further the commercial space sector: driven by growing Indian ambitions, increased technological and manufacturing demand, Antrix's capacity was growing fatigued, leading to the creation of NewSpace India Limited (NSIL), a second commercial arm to ISRO, owned by the Department of Space.[7] The main difference between the two relates to their business models and the types of contracts they are tasked to manage: Antrix is maintaining a focus on the supply side, mostly managing legacy or long-lasting contracts to commercialise ISRO technologies and services

[6] Indian Space Research Organization, Antrix Corporation Limited, latest access: 3 February 2026.

[7] Antrix Corporation has also been at the centre of a long-lasting legal battle that has attracted much attention through the years. In 2005, Antrix signed a bilateral investment agreement with Devas, a communication firm that would provide multimedia services through S-band satellite spectrum leased from ISRO's commercial arm. The contract was rescinded by New Delhi in 2011, officially due to increased demand for allocation of spectrum that was needed for national purposes (defence and infrastructure), but actually over allegations of corruption. The legal battle that arose became a major case in India, with multiple rulings in favour of one or the other company, overturned several times between 2021 and 2025, and the case and its implications with foreign investors in the deal are still ongoing. P. Ranjan, "Devas v. Antrix: Lessons for India in Navigating Bilateral Investment Treaty Disputes", Observer Research Foundation, April 2022; "US Supreme Court reverses order which provided relief to Government of India in dispute over $1.2 billion award for failed 2005 Devas-Antrix satellite deal", *The Indian Express*, 7 June 2025.

(launches, manufacturing, consultancy); while NSIL's work is centred on the demand side, manufacturing technologies (mainly SLVs) for new and recent commercial contracts. In this current context, ISRO has moved to play a more research and exploration-oriented role, managing the national programme and its missions and focusing on research and development, while dealing directly with production and services is up to NSIL and Antrix. Finally, the picture is completed by the setting-up in 2020 of the Indian National Space Promotion and Authorization Centre (IN-SPACe), the regulating agency under the Department of Space that bridges the requests of the private sector with ISRO and the government. In other words, IN-SPACe's main task is to authorise and supervise, under governmental oversight, the activities of all non-governmental space enterprises across India, from launches to usage of infrastructures and facilities, to data sharing and other services.

Through in-house built technology and the work of ISRO, Antrix and NSIL, India has launched more than 430 foreign satellites from over 35 countries up to now, primarily using the Polar Satellite Launch Vehicle (PSLV), a four-stage medium-weight capacity rocket, which earned their reputation of reliability and affordability. India has mastered multipurpose satellite manufacturing and is particularly well-known for its robust remote sensing capabilities, with earth observation satellites achieving sub-metre spatial resolution. The communication sector continues to be a major area of growth, driven by rising demand for broadband connectivity, direct-to-home services and disaster management support.

With over $354 million raised in the past five years – even though most of it remains concentrated in early-stage equity – India's space sector is currently occupying a very limited share (2-3%) of the global space market, but it plans to capture about 8 to 10% of this market share around 2030.[8] Its ambitions

[8] "Unlocking Access to Finance in India's Space Economy: Pathways, Barriers and Global Lessons", World Economic Forum, November 2025.

have been outlined in the "Decadal Vision and Strategy for the Development of the Indian Space Economy", released in September 2023 by IN-SPACe, where India envisions for itself a future position of dominance in the world's space industry.[9] The Vision reports that India's space economy was valued at $8.4 billion as of 2022, but projections estimate this figure will grow fivefold to $44 billion by 2033. The Indian space tech market is expected to record a compound annual growth rate (CAGR) of 26% from 2023 to 2030. This push is underpinned by the presence of over 400 space tech start-ups have emerged since 2020, which are also contributing to India's attracting many new global investors. This has become possible with Indian taking various policy initiatives, among which two have particular relevance.

The first one is the 2023 Indian Space Policy, which could be viewed as an overarching policy that formally permits private sector to undertake end-to-end space activities, including satellite constellation establishment, launch vehicle development and space-based services. Indian private company Skyroot[10]allows 100% foreign direct investment (FDI) in satellite manufacturing and lays out a clear framework for private participation. In October 2024, The Indian government has allocated a venture capital (VC) fund of $117.23 million for the space sector. The second initiative is the Technology Adoption Fund, approved in 2025. These initiatives create a compelling opportunity for India to lead in the global space economy. But traditional investment models remain poorly suited to the sector's long development cycles, high R&D costs remains.[11]

[9] Indian National Space Promotion and Authorization Centre, "Decadal Vision and Strategy for the Development of the Indian Space Economy", September 2023.

[10] "India's Private Spacetech Boom: A New Era Unfolds", India Brand Equity Foundation, 5 September 2025.

[11] World Economic Forum (2025).

Finally, a "Decadal Vision and Strategy (2025-35) for the Development of the Indian Space Economy", released in 2023 by IN-SPACe, presents a roadmap to transform India into a dominant space power by leveraging space technology for economic growth, strengthening national capabilities and generating socio-economic benefits. This strategy is developed for a space ecosystem which is broadly classified into three groups: Space-for-Earth, Access-to-Space and Space-for-Space and identifies the role private industry can play thin such domains.[12]

Public-coPrivate Partnerships, Industrial Transformation and Future Ambitions

In the landscape depicted above, one of the major focuses of IN-SPACe is to work with the private sector to establish a space-based Earth Observation (EO) system through a public-private partnership (PPP). Indeed, private agencies have been selected to design, manufacture and operate India's first fully indigenous commercial EO satellite under the pioneering PPP model. From a financial perspective, the private consortium is set to invest around $150 million over the next five years to launch a constellation of 12 state-of-the-art EO satellites, equipped with panchromatic, multispectral, hyperspectral and microwave Synthetic Aperture Radar sensors.[13] NewSpace India Limited (NSIL) is engaging with the private sector in various domains of space related activities, like launch vehicles, satellites, ground segment and applications. In the launch vehicle sector, NSIL has signed a contract with Hindustan Aeronautics Limited (HAL), a public sector enterprise and lead partner of the HAL and L&T consortium, for the complete manufacturing of five

[12] Indian National Space Promotion and Authorization Centre (2023).

[13] Indian National Space Promotion and Authorization Centre, Public-Private Partnership model to design, build, and operate Earth Observation satellite, last access: February 2026.

PSLVs. PSLV is a four-stage, third generation launch vehicle of India. It is the first Indian launch vehicle to be equipped with liquid stages. After its first successful launch in October 1994, PSLV has emerged as a reliable and versatile workhorse launch vehicle with high reliability of over 90%. The vehicle, essentially developed for launching satellites in LEO, has been adapted by ISRO on several occasions by using various innovative methods and PSLV has even used for launching missions to Moon and Mars. HAL has also received a contract for undertaking launches by using SSLV system.

Enterprises working with ISRO can be grouped into four categories based on ownership and how long they have partnered with ISRO. These include public sector enterprises, established private companies with long-standing ties to ISRO, newer private companies that have recently entered the space industry and innovative start-ups driving new technologies. This classification reflects the wide range of contributors to India's space programme. Today, there are legacy private sector enterprises like Larsen & Toubro (L&T), Tata Advanced Systems Ltd, Godrej Aerospace and few others are part of ISRO's ecosystem.[14] Also, more than 400 start-ups are trying to increase their footprint in the space domain. Broadly, the Indian public-private partnerships play an important role in driving the development of the space sector. Currently, Indian start-ups are mainly involved in the small satellite manufacturing, satellite data analytics, small satellite manufacturing, satellite data analytics, development of ground segments and space situational awareness. Limited few are trying to establish satellite launch facilities. It needs to be noted that private sector is trying to establish itself in the space domain and would require some more time to advance fully.

By awarding major launch-vehicle-related contracts fully or partially to established public sector undertakings such as HAL,

[14] S. Mani, V.K. Dadhwal and C.S. Shaijumon, "Space economy of India, its impact on the rest of the economy", *Space Policy*, vol. 73, August 2025.

ISRO looks to adopt a deliberately cautious approach towards private industry involvement of in large, high-risk space projects. Possibly, ISRO could be looking to work with entities that already possess proven technical capabilities, institutional experience, especially in mission-critical systems like PSLV and SSLV. Since, many private firms are still in the process of building technological depth and financial resilience. It is expected that in the coming years, as these industries expand their expertise, experience and infrastructure, ISRO will involve them in major projects.

While speaking on the occasion of National Space Day (23 August 2025), Indian Prime Minister Narendra Modi has urged India's private sector and startups to step forward with the vision of launching 50 rockets per year.[15] Some reports indicate that by 2030, India's private industry will be able conduct 40 to 45 launches each year for global customers and India would emerge as the third largest spacetech economy by around the space period.[16] In 2022 the Indian start-up Skyroot Aerospace has successfully undertaken suborbital test flight. They established a facility, designed to produce one rocket per month. Soon they are expected to undertake their maiden full-scale orbital mission with the Vikram-1 rocket, aiming to deploy satellites into Low Earth Orbit. However, these are early days, it would be difficult to extrapolate the future based only on ambitions; significant progress will require leapfrogging in infrastructure development and the maturation of technology.

[15] "PM urges private sector to build 5 Unicorns, make 50 rocket launches annually in next 5 years", *DD News*, 23 August 2025.

[16] S. Elizabeth, "India to become third largest space-tech economy by 2030: Report", *The Hindu*, 23 January 2026.

Conclusion

Broadly, India's space programme, led by ISRO with increasing participation of the private sector, could be said to have evolved from modest experimental beginnings into a mature, reliable and cost-effective programme carting for social, scientific and commercial needs. Building on successes in launch vehicles, planetary exploration and space-based applications, ISRO is now entering a new phase focused on human spaceflight and sustained presence in space through the Gaganyaan mission, and plans for the establishment of an indigenous space station by 2040. India is also keen to expand lunar ambitions including future human visits to lunar surface. All these initiatives signal India's intent to move beyond access to space towards a long-duration operations and deep-space exploration.

India is treating space as an increasingly important tool of foreign policy, using it to foster partnerships, goodwill and technological collaboration with various countries. By offering satellite launches, sharing space-based data and pursuing joint missions through ISRO, India has built a reputation as a dependable and cost-effective space partner. Today, even major powers and globally recognised space agencies are increasingly opting for launch services offered by ISRO. In the arena of space security, India is gradually refining its approach to reconcile emerging security requirements with its long-standing stress on the peaceful use of outer space.