

# AWAITING LIFT-OFF INTO THE SECOND SPACE AGE

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'The space sector is poised for take-off — as a transformative growth multiplier like the IT industry did for the national economy in the 1990s'. Photo: ISRO

The Space Age began in 1957 with the launch of satellite Sputnik 1, and in 1961, cosmonaut Yuri Gagarin became the world's first person in space. Neil Armstrong made history by walking on the moon in 1969. The First Space Age became reality.

Today, the Second Space Age is here. Though there is no precise date for its beginning, the contrast in today's space domain is stark. Between the 1950s to 1991, a period dominated by the Cold War, 60 to 120 space launches took place annually and 93% of these were by the United States and the erstwhile Union of Soviet Socialist Republic (USSR) governments. Three decades later, there are not only many more actors in the space scene, but a majority are also private companies. Last year, there were 180 rocket/space launches, 61 by Elon Musk's Space X; 90% of global space launches since 2020 are by and for the private sector.

India made a modest entry into the First Space Age in the 1960s. The first sounding rocket, a U.S. supplied Nike-Apache, was launched at Thumba (Kerala) in 1963 and in 1969, the Indian Space Research Organisation (ISRO) was set up. It has come a long way since, with over 15,000 employees and an annual budget between 12,000 crore-14,000 crore in recent years. Through these decades, it has sought to prioritise societal objectives and benefits.

Its first major project was Satellite Instructional Television Experiment (SITE) that involved leasing a U.S. satellite in 1975-76 for educational outreach across 2,400 villages covering five million people. Satellite technology was a new mass communication tool. This led to the INSAT series in the 1980s, followed by GSAT, that provided the backbone for the country's telecommunication and broadcasting infrastructure.

This was followed by remote sensing capability development. The use of space-based imagery for weather forecasting, resource mapping of forests, analysing agricultural yields, groundwater and watersheds, gradually expanded to cover fisheries and urban management. Following the Indian Remote Sensing programme, this plan grew with the Oceansat and Cartosat series. The field of satellite-aided navigation emerged later. It began with GAGAN, a joint project between ISRO and the Airports Authority of India, to augment Global Positioning System (GPS) coverage of the region, to improve air traffic management over Indian airspace. This has now been expanded to a regional navigation satellite system called Navigation with Indian Constellation (NavIC).

In parallel came the development of satellite launch capabilities. Beginning with the SLV-1 in the 1980s, it took a decade before ISRO developed the PSLV series that has become its workhorse with over 50 successful launches.

The origins of the Second Space Age can be traced to the Internet. In India, the process began accelerating as the 1990s saw the emergence of private TV channels, together with cable TV followed by direct-to-home transmissions. The demand for satellite transponders and ground-based services exploded. Today, more than half the transponders beaming into Indian homes are on foreign satellites.

The last 15 years witnessed another transformation, and this time India was in lockstep with the developed world. The age of mobile telephony, followed by smartphones has shown the world what a data-hungry and data-rich society India is. Broadband, OTT and now 5G promise a double-digit annual growth in demand for satellite-based services.

In 2020, the global space economy was estimated at \$450 billion, growing to \$600 billion by 2025. The Indian space economy, estimated at \$9.6 billion in 2020, is expected to be \$13 billion by 2025. However, the potential is much greater with an enabling policy and regulatory environment. The Indian space industry could easily exceed \$60 billion by 2030, directly creating more than two lakh jobs.

The reason is that in terms of the end-user revenue, only a fifth is generated by the government. Media and entertainment account for 26% of India's space economy, with consumer and retail services accounting for another 21%. In terms of space activities, downstream activities such as satellite services and associated ground segment are dominant, accounting for over 70% of India's space economy; upstream activities of satellite manufacturing and launch services contribute the smaller share. A similar trend can be seen in developed countries. The reason is that India has been an early adopter of digital app-based services.

The growing role of the private sector is also evident in the numbers and ownership of satellites. According to the United Nations Office for Outer Space Affairs (UNOOSA), there are 8,261 satellites in orbit, of which nearly 5,000 are active. Till 2010, about 60 to 100 satellites were launched annually. The pace has picked up in recent years. In 2020, 1,283 satellites were launched. Today, Starlink operates a constellation of over 3,500 satellites and has a million paying customers. Both Starlink and OneWeb (in which Airtel has a stake) project constellations of 40,000 satellites each. And Jeff Bezos of Amazon has launched Project Kuiper to bring low-latency broadband connectivity around the globe. How this domain will be regulated is a separate challenge, but this provides a glimpse of the scope of expansion.

The Indian private sector is responding to the demands of the Second Space Age. From less than a dozen space start-ups five years ago, there are over 100 today. The pace of investment is growing. From \$3 million in 2018, it doubled in 2019 and crossed \$65 million in 2021. The sector is poised for take-off — as a transformative growth multiplier like the IT industry did for the national economy in the 1990s.

Today, ISRO manages four to five launches annually. It manages 53 operational satellites – 21 for communication, 21 for earth observation, eight for navigation and the remaining as scientific experimental satellites (China operates 541). In addition, ISRO has missions such as Chandrayaan, Mangalyaan and Gaganyaan (manned space mission). ISRO has always been an open organisation that has worked closely with the Indian private sector. However, for some private sector companies, space technology-related work is a small part of their revenue stream. They were content as vendors, producing to defined specs and designs.

The start-ups are different. Their revenue stream depends on space-related activities and they need a different relationship with ISRO and government. ISRO today is the operator, user, service provider, licensor, rule maker and also an incubator. It has steered India through the First Space Age and needs to do what it can do best now within its resources and its high-quality manpower — research. To be fair, the government has been mulling over this. In 2017, the government introduced the first draft Space Activities Bill in Parliament but it lapsed in 2019. There has been talk of commercialising the PSLV and SSLV launch services and NewSpace India Limited (NSIL) was set up to replace Antrix. The Indian National Space Promotion and Authorization Centre (IN-SPACe) was set up in 2020 as a single-window-clearance for the private sector. However, it is unclear whether it will emerge as the licensing authority or a regulator. An Indian Space Association (ISpA) was created as an industry association.

In recent years, a series of policy papers have been circulated for discussion — a satcom/telecom policy, an earth observation policy and a foreign direct investment policy. These have served a purpose. What is needed now is legislation (a space activities act). This provides the legal grounding that policy papers lack; help set up a regulatory authority and create an enabling environment for raising venture capital funding into the Indian space start-up industry. The window of opportunity for India to join the Second Space Age exists; it should not be lost.

***Rakesh Sood is a former diplomat***

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