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4. India's Space Economy

India's space economy, currently valued at approximately \$8 billion and contributing 2–3% of the global space economy, is projected to grow five-fold to \$40–45 billion over the next decade. The government has set an ambitious target of capturing 8% of the global space economy by 2030 — a goal that would require transforming India from a predominantly government-driven space programme into a dynamic, private-sector-led commercial space ecosystem while retaining the foundational strengths of ISRO's proven capabilities.

1. India's Space Sector: Foundational Strengths

1. **Cost competitiveness** is India's most distinctive and internationally recognised advantage. India's space missions are executed at a fraction of comparable global benchmarks. Mangalyaan — India's Mars Orbiter Mission — cost \$74 million, compared to NASA's MAVEN mission at \$671 million. This approximately nine-fold cost advantage is not accidental; it reflects indigenous component development, highly skilled but cost-competitive engineering talent, frugal engineering culture, and efficient project management. This cost structure positions India as a globally competitive destination for affordable satellite launch and space services.
2. **Proven track record across mission categories:** Chandrayaan-3's historic successful soft landing at the lunar south pole in August 2023 — a feat that had eluded Russia's Luna-25 just days earlier — confirmed India's capabilities in deep space exploration. Aditya-L1, India's first solar observatory mission, successfully reached the L1 Lagrange point. The Space Docking Experiment (SpaDeX) in 2025 demonstrated India's ability to execute complex rendezvous and docking manoeuvres — a technology prerequisite for future crewed missions, space stations, and satellite servicing. ISRO's commercial arm, **NewSpace India Limited (NSIL)**, is increasingly managing global satellite launch contracts, demonstrating end-to-end commercial capability.
3. **Diverse industrial applications:** Space-derived data has been systematically integrated across India's productive sectors. Applications span crop monitoring and precision agriculture, disaster management and flood mapping, urban planning, defence surveillance, navigation through NavIC (India's indigenous GPS system), and weather forecasting. This embedding of space economy across non-space sectors multiplies the economic return from space investment.
4. **Strategic autonomy:** Indigenous development of cryogenic engines, GSLV and LVM3 launch vehicles, and the upcoming Gaganyaan human spaceflight mission collectively reduce India's dependence on foreign launch infrastructure — for both civilian satellite deployment and defence applications.

2. Recent Structural Reforms

The most consequential policy shift in India's space sector has been the systematic opening of the sector to private participation — a transformation compressed into a few years of legislative and regulatory action.

1. **Space Sector FDI Liberalisation (2024)** permits 100% FDI in satellite manufacturing and operation, launch vehicles, and spaceports — with up to 74% under the automatic route. This unlocks global venture capital and institutional investment for Indian space ventures for the first time.

2. **Indian Space Policy, 2023** creates a structured three-tier ecosystem: ISRO focuses on R&D and national missions, NSIL handles commercial operations, and **IN-SPACE (Indian National Space Promotion and Authorisation Centre)** serves as the single-window regulatory enabler for private players — providing access to ISRO facilities, launch infrastructure, and technical expertise while significantly reducing entry barriers.
3. **Geospatial Data Liberalisation (2021)** removed licensing requirements for geospatial data below 1-metre resolution, enabling private mapping companies, analytics firms, and location-tech startups to build commercial products on space-derived data — spawning an entirely new layer of the space economy.

3. Significance of Space Investment

1. **Economic multiplier:** Every dollar invested in space generates an estimated \$7–8 in downstream economic activity through satellite communications, remote sensing, precision agriculture, and navigation services.
2. **Defence and security:** Indigenous military satellite surveillance, encrypted communications, and missile tracking reduce dependence on foreign intelligence assets and strengthen strategic deterrence.
3. **Climate and disaster resilience:** Satellite-based real-time flood mapping, cyclone tracking, and forest fire monitoring directly support India's climate adaptation and disaster risk reduction frameworks.
4. **Global launch market ambition:** India targets 10% of the global commercial launch market by 2030. NSIL's growing portfolio of launch service contracts positions India as a low-cost, reliable alternative to Arianespace and U.S. providers for small and medium satellite operators.

4. Challenges

1. **Private sector scaling gap:** Despite 400+ companies, most Indian space startups remain pre-revenue. Limited domestic procurement mandates restrict their ability to scale beyond the prototype stage toward production-level commercial viability.
2. **Regulatory lag:** The Space Activities Bill — which would provide legal certainty on liability, intellectual property rights, spectrum allocation, and orbital slot management for private operators — remains pending, creating legal uncertainty that inhibits long-term private investment commitments.
3. **Skilled talent bottleneck:** Advanced aerospace engineering requires specialised expertise in propulsion, materials science, and embedded systems that India's universities produce in inadequate numbers relative to the sector's ambition.
4. **Infrastructure access constraints:** Private launch companies remain heavily dependent on ISRO-owned launch infrastructure at Sriharikota; limited pad availability and scheduling conflicts restrict the commercial launch frequency that private operators need to build viable businesses.
5. **Global competition:** SpaceX's Starlink constellation, Arianespace's evolving offerings, and China's rapidly growing commercial launch capacity are all compressing pricing and market share, demanding rapid Indian capability scaling to remain competitive.
6. **Critical mineral dependency:** Rare earth elements and advanced composites required for satellite and launch vehicle manufacturing are predominantly imported, creating supply chain vulnerability.

5. Way Forward

1. **Fast-track the Space Activities Bill** to resolve the legal uncertainty that is the single largest structural barrier to private investment in the sector.

2. **Mandate domestic space procurement targets** for all government departments, creating the assured demand pipeline that allows Indian startups to graduate from prototypes to production-scale operations.
3. **Develop a second launch complex** with dedicated private operator access, reducing scheduling dependency and increasing national launch cadence.
4. **Leverage bilateral space cooperation** — particularly with the USA under the Artemis Accords framework, France through ISRO-CNES cooperation, and Japan — to access advanced technologies and joint mission opportunities.
5. **Create a Space Economy Development Fund** under the Research, Development and Innovation (RDI) Scheme corpus to provide patient capital for deep-tech space startups with long gestation requirements.

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