



**INDO-JAPAN CHAMBER OF COMMERCE & INDUSTRY**

# **Indian Space Industry - Increasing Opportunities**

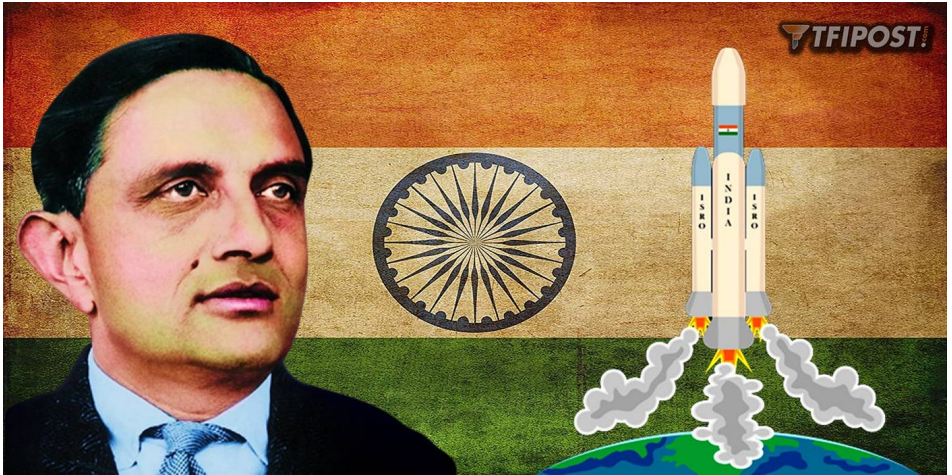
by  
**D.V. Venkatagiri**



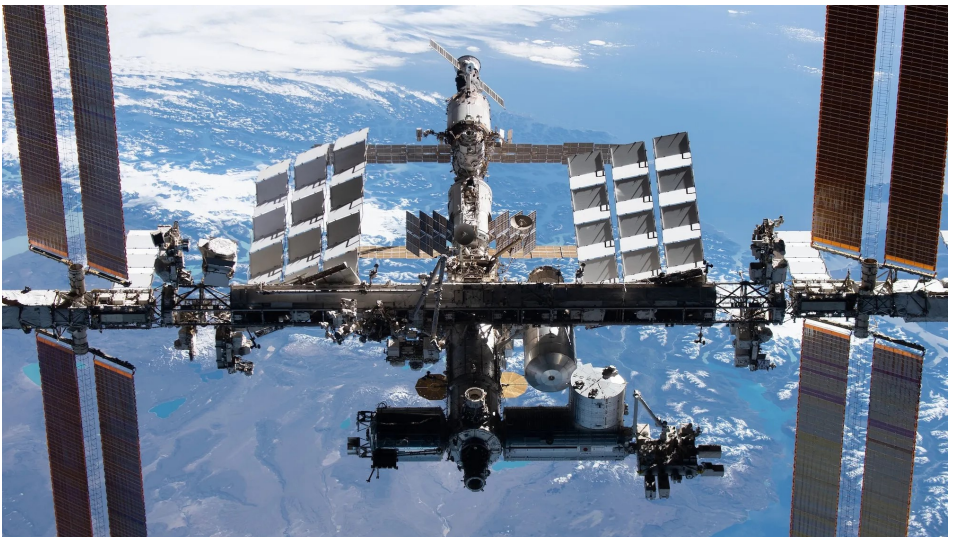
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# **Indian Space Industry - Increasing Opportunities**

**by  
D.V. Venkatagiri**



Vikram Sarabhai – Founder Chairman of ISRO



International Space Station

## PREFACE

Dear Readers,

We are happy to present to our readers a Resource Paper on Space Industry. An attempt to enlighten the Indian and the international community, particularly the Japanese business community about the not much explored yet highly potential industry.

The author Mr. D.V. Venkatagiri is the Founder and CEO of “Explore The Space” (ETS), an NGO, based in Chennai, India, facilitating B2B connections in the Space Industry; an ISRO - (Indian Space Research Organisation) registered Space Tutor, running programmes in Schools and Colleges across geographies.

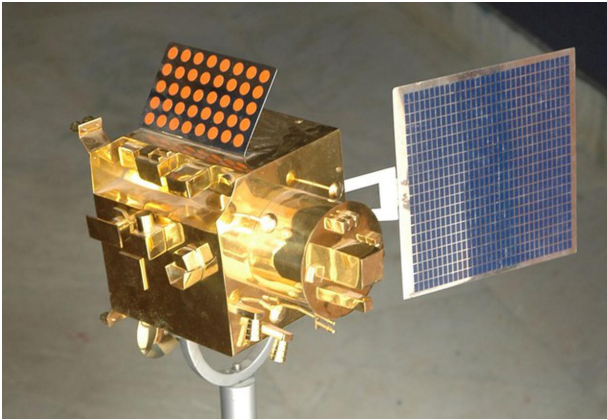
Mr. D.V. Venkatagiri is an Engineering Graduate with Masters in Economics. He has played pivotal role in leading Chambers of Commerce and Industry Associations. He had the special privilege of being invited to the US by the State Department under the International Leadership Programme.

The Resource Paper will help understand the growing Indian Space scenario and its dynamism. Japan and India, in recent years, have been working very closely on economic, defence, strategic and security areas; forging close cooperation in Space Sector can bring in tremendous revolutionary impacts in the Asia Pacific region in many ways. In addition to the governments initiatives, it is imperative that the business community in both the countries get together for ushering in a new ‘India-Japan Space Era’.

We hope the readers would find the Resource Paper interesting and informative.

June 2024

**Suguna Ramamoorthy**  
Secretary General, IJCCI



Chandrayaan-1  
(2008)

Chandrayaan-2  
(2019)



Chandrayaan-3  
(2023)

## **Indian Space Industry - Increasing Opportunities**

The Space industry encompasses a large number and wide variety of activities, technologies, and organizations focused on exploring, utilising, and exploiting outer space. It has evolved significantly since the launch of the first satellite - Sputnik by erstwhile USSR in October 1957. Today, the Space Industry involves both governmental space agencies like NASA (USA), ISRO (India), ROSCOMOS (Russia), JAXA (Japan), CNSA (China), ESA (European Nations), UAE Space Agency (UAE) and a growing number of private companies around the world.

### **The Global Space Industry Scenario**

Space is approaching a new frontier as the Space economy is expected to grow to USD 1.8 trillion by 2035 from the current value USD 630 billion as satellite and rocket enabled technologies become increasingly prevalent, according to a new report.

Already, space-enabled technologies drive everything from weather forecasts to the increasingly ubiquitous smart gadgets such as smart watches. Yet space technologies are also delivering benefits to a wider range of stakeholders, with industries such as retail, consumer goods and lifestyle; food and beverages; supply chains and transport; and disaster mitigation, all set to benefit from Space Innovations.

“Space technologies are delivering greater value to a more diverse set of stakeholders than ever before,” said Sebastian Buckup, Member of the Executive Committee, World Economic Forum. “As costs reduce and accessibility rises, these technologies could reshape whole industries, and have as much impact on Space Business and Society as smartphones or cloud computing.”

Space exploration remains the most important objective of the space industry. It involves sending spacecraft and satellites beyond Earth’s atmosphere to study celestial bodies, understand the universe, and advance

scientific knowledge. Missions range from robotic probes like Voyager and Mars rovers to manned missions to the International Space Station (ISS) and, in the future, potentially to Mars and beyond. Exploration also includes telescopic observations and deep-space exploration aimed at understanding the origins of the universe and searching for extra terrestrial life. Special mention needs to be made about the engineering marvel - NASA's James Webb Space Telescope - that is currently revolving around the Sun and taking breathtaking images about our Universe.

### **The great advancements taking place in Satellite Technology**

Satellites play a pivotal role in modern life and are a major component of the space industry. They are used for telecommunications, broadcasting, weather forecasting, navigation (GPS), Earth observation (monitoring weather patterns, climate change, urban growth, etc.), and scientific research - Satellite technology continues to advance with smaller, more capable satellites being developed, including constellations of small satellites for global internet coverage.

### **Commercialization of Space Industry - Industry Growth - Space Tourism**

In recent years, the space industry has seen rapid commercialization driven by private companies. SpaceX, founded by Elon Musk, exemplifies this trend with its reusable rocket technology and ambitious goals to colonize Mars. Space X compete with traditional aerospace giants like Boeing and Lockheed Martin, stimulating innovation and reducing costs in the industry.

A burgeoning sector within the space industry is space tourism, offering civilians the opportunity to experience space travel. Companies like Virgin Galactic and SpaceX are developing vehicles for suborbital and orbital flights respectively.

### **Resource Utilization and Mining**

The concept of resource identification and utilization beyond Earth is a key factor driving space exploration. This includes mining asteroids for

precious metals and water, which could support future space missions and even sustain life in space colonies.

### **International Collaboration**

Collaboration in the space industry extends globally through partnerships between countries, international organizations like the European Space Agency (ESA), and private-public partnerships. These collaborations share expertise, reduce costs, and enable ambitious projects like the ISS (International Space Station), a symbol of international cooperation in space exploration.

### **The Indian Space Programme**

India's space programme, spearheaded by the Indian Space Research Organisation (ISRO), has evolved into a robust and globally recognized initiative since its inception in the early 1960s.

India's journey into space exploration began with the establishment of the Indian National Committee for Space Research (INCOSPAR) in 1962, which later evolved into ISRO in 1969. The program gained momentum with the successful launch of India's first indigenous satellite, Aryabhata, in 1975, marking India's entry into the space age.

### **Objectives of the Indian Space Programme**

- **Space Exploration:** ISRO aims to explore space and conduct scientific research to enhance humanity's understanding of the universe. This includes missions like Chandrayaan (Moon missions) and Mars Orbiter Mission (MOM), which have garnered international acclaim for their success and cost-effectiveness.
- **Satellite Development:** ISRO develops and launches satellites for various applications such as communication, Earth observation, navigation (IRNSS/NavIC), meteorology, and scientific research. Notable satellites include INSAT series for communication and Cartosat series for high-resolution Earth imaging.



- **Applications for Development:** ISRO uses space technology to address socio-economic challenges in India. Applications include telemedicine, tele-education, disaster management, agricultural monitoring, and rural connectivity through satellite communication.

## **Major Achievements of ISRO**

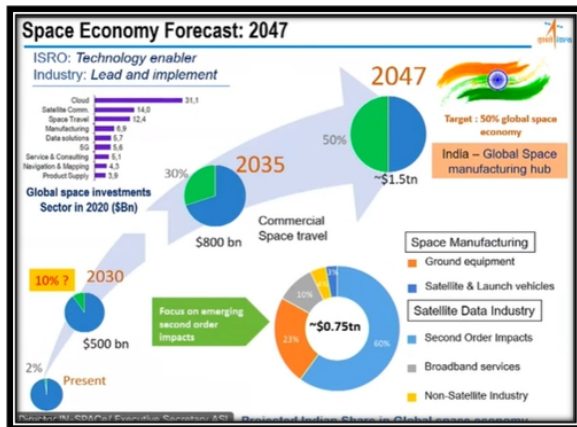
- **Mangalyaan (Mars Orbiter Mission):** Launched in 2013, Mangalyaan made India the first Asian country to reach Martian orbit and the fourth space agency globally to do so, demonstrating ISRO's capability in interplanetary missions.
- **Chandrayaan Missions:** Chandrayaan-1 (2008) discovered water molecules on the Moon's surface, and Chandrayaan-2 (2019) aimed to land on the Moon's south pole (Vikram lander), showcasing India's lunar exploration capabilities. Chandrayaan-3 (2023) successfully achieved its mission objective of landing a rover on the Moon, continuing India's exploration efforts beyond Earth's orbit.
- **Aditya-L1:** ISRO's solar mission aimed at studying the Sun's outermost layer, the corona, to improve understanding of solar activity and its impact on space weather.
- **Satellite Launch Capability:** ISRO has developed reliable launch vehicles like the Polar Satellite Launch Vehicle (PSLV) and the Geosynchronous Satellite Launch Vehicle (GSLV), offering cost-effective solutions for international satellite launches.
- **International Collaborations:** ISRO collaborates with space agencies worldwide, contributing to joint missions, satellite launches, and technology exchange. It also offers commercial satellite launch services through its commercial arm.

## **Recent Developments in the Indian Space Industry**

India's space industry is undergoing a big change in recent years, marked by significant achievements and a paradigm shift in its approach. ISRO has been

at the forefront of these accomplishments, making substantial strides in space exploration, satellite launches, and technological advancements.

The privatisation of the space sector in India has emerged as a pivotal development, bringing new players and dynamics to the industry. India's space programme is one of the most cost-effective in the world and has gained global recognition for successfully launching lunar probes, constructing satellites, transporting foreign satellites, and even reaching Mars. (Mangalyaan)



The global space economy is predicted to grow to 1.8 trillion by 2035, from the current value USD 360 billion. Today, India accounts for around 2% of the global space industry. The Indian space economy is projected to grow to \$12.84 billion by 2025, according to a joint report by Ernst & Young (EY) and the Indian Space Association (ISpA), the apex industry body created to be the collective voice of the Indian space industry.

According to a report, as many as 60,000 satellites are expected to orbit Earth by 2030, up from the current 9,000 satellites. This will create a great deal of opportunities for the Space Industry. India's share of 2% of the global space market, is a fraction of its capabilities and that is the main reason driving the change towards private participation in the Indian Space Industry.

The Indian private sector - manufacturing, engineering, computer software and system integration - given their proven capabilities and global recognition can certainly cater to the increasing demand created by the exploding opportunities in the global space industry.

The Government of India, Department of Space, has created a new organisation called IN-SPACe, which will support India's business sector, including start-ups and diversifying established firms, to take part in the country's space journey. NSIL, another new organisation that has been created will be responsible for producing, assembling and integrating launch vehicles in the coming days. ISRO will in future, carry out capacity building in Space domain through development of new technologies and capabilities and enable sharing of facilities by NSIL and Non-Government Private Entities (NGPEs).

### **Indian Government's Space Policy and Geospatial Policy**

India's Space and Geospatial Policy outlines the framework and guidelines for managing activities related to space exploration, satellite deployment, and geospatial data within the country. The policy emphasizes strategic objectives such as promoting scientific research, supporting commercial applications, enhancing national security, and fostering international cooperation.

#### **Key aspects of India's Space Policy include:**

- Promoting Space Exploration: (R&D, Exploration of Celestial Bodies, Deep Space Missions)
- Satellite Deployment: (Launch and operation of satellites for communication, remote sensing, weather forecasting, navigation)
- Commercial Applications: (Private sector participation, Innovation and Entrepreneurship).
- National Security: (Surveillance, Defense preparedness).
- International Cooperation: (Joint missions, leverage global expertise)

India's Geospatial Policy focuses on regulating the acquisition, dissemination, and use of geospatial data to ensure accuracy, reliability, and security. It promotes the development of geospatial technologies for applications in agriculture, urban planning, disaster management, and environmental monitoring while safeguarding national interests and sovereignty.

Overall, India's Space and Geospatial Policy aims to harness space technology for socio-economic development, strengthen national security, and position India as a global leader in the space domain through innovation and collaboration.

### **Small and Big Companies in Indian Space Industry**

In India, the space industry includes both large governmental organizations and smaller private companies, each playing crucial roles in advancing space technology, satellite manufacturing, and space applications.

#### **Large Companies( Illustrative List )**

Indian Space Research Organisation (ISRO) :

- As India's primary space agency, ISRO designs, develops, and launches satellites for communication, Earth observation, navigation, and scientific research.
- Godrej
- Larsen &Toubro
- Walchandnagar Industries
- Data Patterns

#### **Small and Medium Enterprises (SMEs) ( Illustrative List )**

- Ananth Technologies : manufacturer of aerospace systems and provider of geospatial services.
- Bellatrix Aerospace : a startup focused on developing orbital transfer vehicles and satellite propulsion systems using green propellants. They aim to reduce satellite launch costs and improve satellite maneuverability.

- Pixxel : a startup planning a constellation of Earth observation satellites to provide high-resolution imagery for agricultural, environmental, and disaster management applications.
- Astrome Technologies : developing a constellation of nanosatellites to deliver high-speed internet services worldwide, particularly to underserved regions using millimeter-wave technology.
- Skyroot Aerospace : a startup working on developing indigenous rocket technology, aiming to build cost-effective launch vehicles to deploy small satellites into orbit.
- Agnikul Cosmos : a start up working on small-lift launch vehicles

### **Collaborative Ecosystem**

India's space industry benefits from a growing ecosystem that supports innovation and entrepreneurship. Organizations like the Indian Institute of Space Science and Technology (IIST), the National Institute of Aerospace Technology (NIAT) and the newly formed INSPACe, provide education, research facilities, and support for startups and SMEs in the space sector.

Despite these advancements, challenges such as space debris management, regulatory frameworks, and cybersecurity vulnerabilities persist. The future promises further integration of artificial intelligence (AI), quantum technologies, and renewable energy sources into space systems, enhancing efficiency and sustainability.

As humanity's understanding and capabilities in space grow, so too will be the opportunities and challenges within this dynamic industry.

### **Future Plans and Initiatives of ISRO**

- Gaganyaan: India's ambitious human spaceflight program aims to send astronauts to space using an indigenous crew module, enhancing India's capabilities in human space exploration.

- Reusable Launch Vehicle (RLV): ISRO is developing a reusable spaceplane to reduce launch costs and increase launch frequency, aiming for cost-effective access to space.
- Space Exploration: Future missions include exploring asteroids, Venus, and further Mars exploration missions, demonstrating ISRO's commitment to expanding humanity's reach into the solar system.

While India's ISRO has achieved significant milestones, challenges such as technological advancements, space debris management, and competition from global space agencies remain. The newly formed agencies – INSPACe and NSIL are expected to give a further boost to the Indian Space Programme as the Indian space programme continues to thrive, driven by a skilled workforce, technological innovation, and strategic partnerships with academia, industry, and international space agencies.

The future promises further integration of artificial intelligence (AI), quantum technologies, and renewable energy sources into space systems, enhancing efficiency and sustainability.

India has established itself as a pioneer in space exploration, satellite technology, and applications for socio-economic development. With ambitious plans for the future and a track record of successful missions, India is poised to make further strides in the global space arena, contributing to scientific knowledge, technological innovation, and national development.

### **Growth of Space Industry and the global impact**

Telecommunications Satellites are pivotal in modern telecommunications, enabling global connectivity through services like internet, telephone, and data transmission. The space industry's growth has led to the deployment of increasingly sophisticated satellite constellations. Companies like SpaceX's Starlink and OneWeb are launching thousands of small satellites into low

Earth orbit (LEO), aiming to provide high-speed internet coverage to remote and underserved areas worldwide. These constellations promise lower latency and higher bandwidth, revolutionizing internet access globally.

**TV Broadcast**The space industry has transformed TV broadcast by enhancing signal reliability, coverage, and quality. Geostationary satellites stationed in fixed orbits provide direct-to-home TV services, ensuring consistent reception across vast areas. The advent of High Definition (HD) and Ultra High Definition (UHD) television owes much to advancements in satellite technology. Additionally, satellites facilitate live broadcasts of major events, news coverage, and entertainment globally, linking broadcasters and audiences seamlessly.

Defence Space has become crucial for defence strategies due to its role in surveillance, reconnaissance, navigation, and communication. Military satellites provide real-time intelligence, enabling informed decision-making and strategic planning. The space industry's evolution has spurred developments such as satellite-based missile warning systems, secure communication networks, and satellite-guided precision weaponry. Countries worldwide are making increasing investments in space-based defence capabilities to bolster national security and maintain technological superiority.

The growth of the space industry is profoundly transforming telecommunications, TV broadcast, and defense sectors by expanding connectivity, improving broadcasting capabilities, and strengthening national security. As technological advancements continue, these sectors will continue to evolve, shaping the future of global communications, entertainment, and defence strategies.

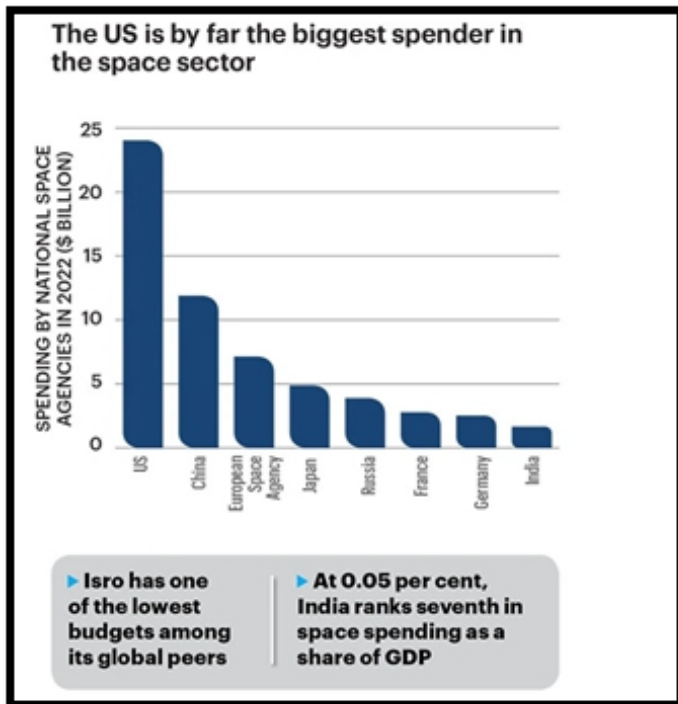
## **Challenges and Opportunities**

The space industry is multifaceted, encompassing exploration, satellite technology, commercialization, tourism, resource utilization, and international collaboration. It continues to expand and evolve, driven by

technological advancements, entrepreneurial spirit, scientific curiosity, and the potential for economic growth.

With new innovations in areas of Satellite Communication and other areas of application including geospatial data-based services, there is an increased demand for Space-based services and the need for more players to venture into upstream and downstream sectors to provide commercial offerings.

Acknowledging the role of the Private Sector, Prime Minister of India, Mr. Narendra Modi said, “India needs to increase its share in the Global Space Industry and the Private Sector will play a big role in that. “The Indian Private Sector has more than 400 Companies including large Indian Conglomerates as well as SMEs working under the leadership of ISRO to develop subsystems for space launch and ground infrastructure.





With the privatisation of the Indian Space Industry, the future can see the emergence of many private players emerging to become “mini - ISROs”. Adding more impetus to this, is the recent amendment of the Investment rules by Government of India permitting 100 % FDI in the Space sector.

### **Indo-Japan Space Cooperation**

India and Japan have a high degree of congruence of political, economic, and strategic interests, view each other as partners that have responsibility for, and are capable of, responding to global and regional challenges.

It is natural, though a bit late, that India and Japan have commenced active cooperation in the Space Sector.

The Lunar Polar Exploration Mission (LUPEX) is a planned joint lunar mission by the Indian Space Research Organisation (ISRO) and Japan Aerospace Exploration Agency (JAXA). The mission would send an uncrewed lunar lander and rover to explore the south pole region of the Moon by 2026. It is envisaged to explore the permanently shadowed regions on the Moon.

The newly formed QUAD (A multilateral group comprising India, Japan, Australia and USA) is expected to further speedup and boost Space Industry Cooperation between India & Japan.

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